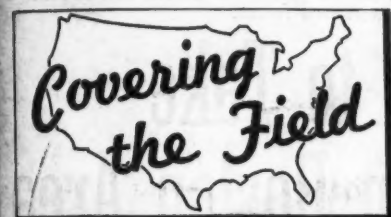


# Contractors and Engineers Monthly

Vol. 45, No. 5

MAY, 1948

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## Dock Construction

A contract to build three railroad coal-loading docks at a lake port (page 1) also included extensive dredging.

## Highway Grading

Reducing grades on a mountain-pass highway called for digging in rock. Page 1. A tortuous road was realigned for 7 miles by two contractors. See page 93.

## Shoulder Stabilization

An article on this page tells how gravel shoulders were stabilized with asphalt and tar on a 2½-mile test section.

## Sewage-Plant Construction

Contracts for the reinforced-concrete structures of a new Boston sewage-treatment plant are described on page 2.

## Concrete Paving

Building a 4-lane divided highway took two sets of paving equipment (page 6). Seven curves and four bridges complicated the job reported on page 84.

## Bridge Construction

Bridges were part of the expressway contract featured on page 6. Page 67 tells how Australia builds her bridges with shop-welded members.

## Highway Maintenance

Plus outlining maintenance methods for bituminous roads, the article on page 23 also stresses personnel training.

## Reports on Conferences

The Western States Conference (page 28) focussed on equipment and methods. The Utah Engineering Conference (page 60) stressed design problems.

## Bituminous Paving

A penetration-macadam base course and hot-mix topping improved an old concrete pavement. The job is covered on page 33.

## Unusual Sand-Moving Job

A story of sand-moving by pumps, monitors, and eductors is told in text on page 40 and in pictures on pages 64-65.

## County Road Work

Keeping farm lands drained is part of the county work described on page 46. Summarized on page 106 is some county experience with oiled-earth roads.

## Rolled-Earth Dam

The Onondaga Indian Reservation is the site of a new compacted-earth dam to guard Syracuse from floods (page 51).

## Roadside Development

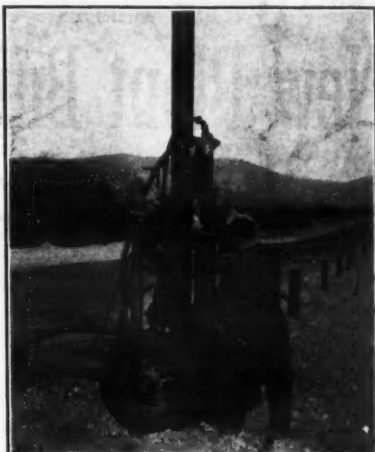
Work of the HRB and AASHO roadside groups will be coordinated (page 59). Main aim of one state's roadside program is to prevent erosion. See page 76.

## Airport Construction

New aprons and taxiways and new drainage facilities were recently added to a municipal airport. Read page 81.

## Reclamation Program

Problems the Bureau of Reclamation faces in its huge construction program are explained in an article on page 89. (You will find "In This Issue" on page 4)



C. &amp; E. M. Photo

In a unique application, this Ingersoll-Rand wagon drill was used to drill holes for guard-rail posts on a Vermont relocation contract.

## Grade Is Reduced On Mountain Pass

Highway Relocated Through Large Boulder Area; Extra Lane Added for Slow Truck Traffic; Tar Surface

★ THE highest point on a Federal highway in New England is at Sherburne Pass in the Green Mountains of Vermont. There U. S. 4 climbs up the side of Mendon Mountain to elevation 2,190. Built back in 1926, this black-top road had an 18 to 20-foot width. It was marked by sharp curves, short sight distances, and a maximum grade of 14 per cent. The Lambert Construction Co. of Montpelier, Vt., under contract to the Vermont Department of Highways, is now relocating a hazardous 1.7-mile section of U. S. 4 that ascends

(Continued on page 18)

## Shoulders Are Stabilized With Asphalt, Tar Mixes

Bitumen and Gravel Are Mixed in Place, Rolled And Bladed on Highway 2½-Mile Test Section

★ LAST autumn the Connecticut State Highway Department mixed bitumen into a stretch of newly constructed gravel shoulders in order to observe the effects of this type of stabilization. The mixed-in-place experiment was done with asphalt along one side of the 2½-mile job, and with tar on the other.

The road selected for the test was a stretch of U. S. 6 that had just been reconstructed under a 2½-mile contract between Bristol and Farmington. D. V. Frione & Co. of New Haven, Conn., was the contractor on the project. It included reinforced-concrete

## Big Railroad Docks Are Built at Lake Port

★ TOLEDO, Ohio, at the southwestern tip of Lake Erie and at the mouth of the Maumee River, the largest stream emptying into the Great Lakes, is the world's largest shipper of soft coal. With shipments of more than 22,000,000 tons annually it surpassed in tonnage, even before the war, such cities as Hampton Roads, Va.; Newcastle, England; Cardiff, Wales; and Duisburg in the Ruhr Valley, Germany.

This coal is brought to Toledo in great trains of coal cars from the bituminous fields of southern Ohio, West Virginia, Kentucky, and Tennessee. At the big coal-handling docks the coal is dumped into the mammoth lake vessels which carry it to other ports on the Great Lakes for use in steel mills and manufacturing plants. Or from these ports it may be shipped inland.

Two of the far-flung railroad systems which carry coal to Toledo—the New York Central and the Baltimore & Ohio—have been using 7,000 feet of coal-loading docks located on the east bank of the Maumee River in the heart of downtown Toledo. To reach these docks, the long lake vessels must sail from 5 to 7 miles up the Maumee. This means frequent opening of the city's bridges over the river, with a resulting tie-up of traffic along the downtown streets. Furthermore, this long tedious passage up the river, past five to seven bridges, also delays the coal loading, and lengthens turn-around time.

### Three New Docks

To remedy this situation, the Lakefront Dock & Railroad Terminal Co. of Toledo is constructing three new docks east of the mouth of the river on the shore of Maumee Bay fronting on Lake Erie. The Toledo Terminal Co. operates a 29-mile belt railroad that encircles the

Sheet-Pile Walls Enclose Dirt Fills; Surrounding Waters Dredged by "Mogul" With 12-Yard Dipper

By WILLIAM H. QUIRK,  
Eastern Editor

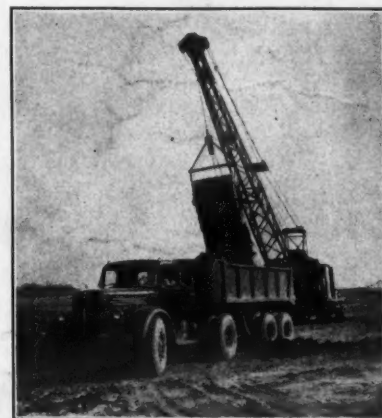
city, and furnishes interchange transfer to 14 other railroads leading in and out of the city and to three intra-city lines.

A contract for the dock project was awarded to Walsh-Bates & Rogers Construction Corp., a combination of the Walsh Construction Co. of Davenport, Iowa, and Bates & Rogers Construction Co. of Chicago, Ill. The entire project will cost around \$18,500,000. It got under way in June, 1946, and is expected to be finished near the end of 1948. When completed, the docks with their coal-loading facilities will be used by the New York Central and the Baltimore & Ohio Railroads, joint owners of the Lakefront Dock & Railroad Terminal Co.

The three new docks, numbered 1, 2, and 3 from east to west, lie nearly due north and south. They are 2,100, 1,800, and 1,100 feet long respectively. Their average width is 250 feet. The docks were constructed by driving sheet piling around their perimeter for a bulkhead wall, and strengthening the piling with steel wales and tie rods. At the narrower sections of the docks the ties extended clear across between the steel sheeting. Where the docks widened out, the tie rods were secured to concrete anchor walls, constructed inside and parallel to the bulkhead. The docks were completed by placing dirt fill within the sheet-pile bulkhead walls.

Back from the docks the project extends southwest 2 miles where a great maze of storage tracks has been laid.

(Continued on page 11)



C. &amp; E. M. Photo

In a borrow pit which supplied dirt fill for the Toledo railroad-dock job, a Lima 602 dragline loads a new Mack-Fruehauf truck trailer with 18 yards. The dragline is equipped with a 50-foot boom and a Page 1¼-yard bucket.

paving 8 inches thick and 24 feet wide, in two 12-foot lanes. And another item called for the construction of gravel shoulders which were to be bituminous surface-treated. The entire cost of the project was \$230,000. Construction started in July, 1947, and was finished in December. Paving was done during October.

### Gravel Shoulders

In cuts, the road shoulders are 9 feet wide, extending out to the line of gutter; in fills they are 12 feet wide. The gravel out of which they are made is graded from 3½ inches down, with from 30 to 65 per cent passing the ¼-inch screen. When compacted, the course of gravel is 8 inches thick, and was laid in either two or three lifts

(Continued on page 97)





C. &amp; E. M. Photo

Personnel on the Nut Island sewage-treatment plant job includes (left to right) Resident Engineer Anthony V. O'Malley, Nick Barletta of the V. Barletta Co., Engineer Frank Venti, and Superintendent Horace Del Grosso.



C. &amp; E. M. Photo

This general view looking northwest shows the Nut Island Sewage Treatment Plant under construction for the Boston Metropolitan District. The new plant is designed to serve a population of 700,000 at present and 900,000 by 1955, in Boston and 42 other municipalities within a 15-mile radius.

## New Plant Built to Take Sewage From Boston Area

THE Nut Island Sewage Treatment Plant for the Boston Metropolitan District is under construction at Quincy, Mass. Begun during the winter of 1945-1946, impressive-looking Project No. 1 is scheduled for completion in 1950. The contracts described here, for building the reinforced-concrete sedimentation, aeration, and digestion tanks together with the conduits and foundations, will be finished this year. The work is under the direction of the Metropolitan District Commission, an agent of the Commonwealth of Massachusetts. The Commission serves the Greater Boston area including the metropolis itself, as well as some 42 other municipalities within an approximately 15-mile radius of the Hub City.

The Construction Division of the Commission is an organization created for heavy construction in the fields of water supply and sewage disposal. Currently it is occupied with such public works as the design and construc-

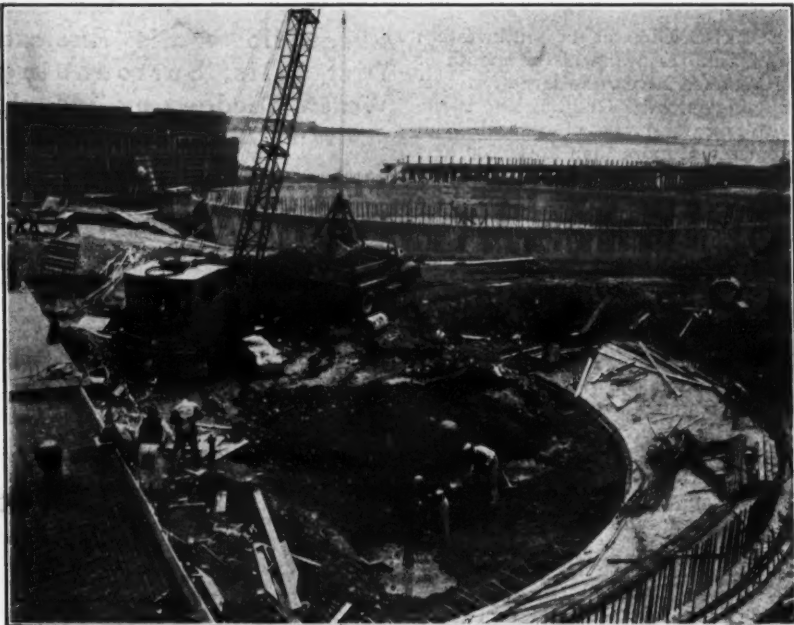
### Includes Sedimentation, Aeration, and Digestion Tanks, All Constructed Of Reinforced Concrete

tion of a new pressure aqueduct to bring additional fresh water to 23 of the municipalities in the Metropolitan area; and the design and construction of several additions to the Metropolitan sewage works. The latter work is divided into five major projects of which only Project No. 1 is under construction.

#### Sewage-Treatment Plant

The new sewage-treatment plant, Project No. 1, is being built at Nut Island, about 9 miles southeast of downtown Boston. It is not really on an island, for a causeway has long connected the site to the mainland at Houghs Neck, which is at the end of a

(Continued on page 101)



C. &amp; E. M. Photo

A Lima crane with a 65-foot boom and a  $\frac{3}{4}$ -yard clamshell bucket excavates for the footings of the sludge-digestion tanks, for the new Boston Metropolitan District, built by Farina Bros., Inc., of Newton, Mass.



C. &amp; E. M. Photos

Above, reinforcing steel is placed for the floor slab of the No. 1 primary digestion tank at Nut Island Sewage Plant. Right, forms are built for the digestion-tank walls.





# Florida paves 16½ miles of U. S. 1

*Resilient, heavy-duty TEXACO ASPHALTIC CONCRETE  
was laid on this major national highway*



A two-course Texaco Asphaltic Concrete pavement with fine-graded top has been laid on 16½ miles of U. S. 1 south of Jacksonville. New construction was used for the first mile, or so-called "model mile," shown in the large photo. On the other 15½ miles, worn concrete was widened and resurfaced with Texaco. The Duval Engineering and Contracting Company of Jacksonville was the contractor.

One of the country's busiest highways, U. S. Route 1 stretches from northern Maine to southern Florida through 14 States and the District of Columbia. Traffic is heavy. In addition to the steady stream of tourist traffic bound for resorts up and down the east coast, it includes numerous trucks loaded with products of every description.

When the Florida State Highway Department paved a 16½-mile stretch of U. S. 1 south of Jacksonville last year, the wearing surface constructed on this heavily-travelled route was fine-graded Texaco Asphaltic Concrete. This hot-mix, hot-laid type of Texaco paving has been demonstrating its durability and

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# Contractors and Engineers Monthly

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For the Highway and Heavy-Construction Industry

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## Winter's Aftermath

When the 1947-1948 winter came to a calendar conclusion on the 20th of March, it had already hung up such unfavorable all-around records for cold and snow as to impress even an Eskimo. But it left its bitterest and most lasting impression on highway maintenance engineers. Possibly never before in modern times had one winter caused so much damage to roads over so widespread an area. Northern states learn to expect their roads to show signs of suffering by the time spring rolls around—but never on the scale of this 1948 spring. And the milder climes to the south, long seemingly immune from the harsher aspects of winter, were also hit hard by everything in Jack Frost's book.

From the Canadian border to Mexico and the Gulf Coast, the country and its highway system absorbed cold wave upon cold wave, accompanied by snow, ice, sleet, and freezing rains. Traces of the Big Snow that struck the northeast on December 26 were still present when spring finally broke through again. As the ice and snow finally receded like some primeval glacier, the damage they had wrought to the highways was exposed to view, and of course was felt by the traveling public.

Great cracks and ruts marked the surfaces. Upheavals like huge boils had erupted through the pavements. Slabs had shifted, holes appeared, and homogeneous masses of roadbed that had been carefully constructed were crumbling away. Previously laid patches had peeled off to add to the general look of disintegration. And what appeared to the eye was not necessarily the sum total of the damage, which had undoubtedly gone deeper into the foundation courses. For as the melting snow filtered down through cracks, it later froze and expanded with more than just superficial damage to the pavement.

Some states, fully cognizant of what they were facing, imposed emergency load limits on many of their roads. This helped to prevent further breakups, and stayed the spread of the deterioration. Some made temporary repairs, knowing that they would have to be repeated later since the frost was not fully out of the ground. Driving, especially night driving, over roads full of holes was dangerous to both car and driver. These holes and ruts had to be filled in and bumps leveled off as soon as possible in the interest of safety, and to avoid property damage and possible law suits.

The Virginia Department of Highways has gone a step beyond the physical repair of its winter-ravaged roads to seek the major causes of failures which invariably follow spring thawing. A survey and study is under way, principally of low types of pavements, to collect all possible data concerning

the condition of every road in the state. Then definite recommendations will be made regarding future procedures to minimize the damage which results from freezing and thawing. Previously, little research has been conducted into low-type pavements and the behavior of stabilized road bases. Thus the results of this present study should be a real contribution to road-building throughout the nation.

Road performances and behavior, and their relationship to soil types and thicknesses, will be examined. The survey will also scrutinize such factors affecting the spring breakup as weather conditions, type and moisture conditions of the subgrade, type and condition of the base and surface, together with traffic loadings. Research and testing engineers will make the survey with the cooperation of district and resident engineers. From this practical survey and study, much worthwhile information should develop which later may be put to good use in road design and construction. Then the damage caused by future severe winters would be minimized, and maintenance costs reduced.

*"Engineering is not a particular area in the field of human endeavor; it is rather a point of view, and anyone who has once had it keeps it no matter where his work lies."*—Harvey N. Davis, President, Stevens Institute.

## Prequalifying Urged For Airport Bidders

The Joint Cooperative Committee of the National Association of State Aviation Officials and The Associated General Contractors of America, Inc., has endorsed the principle of requiring that contractors who bid on airport construction projects be prequalified. A resolution to this effect was adopted at the 29th annual convention of the Associated General Contractors held recently in Dallas, Texas.

In order to qualify, and thus be eligible to enter a bid on a project, a contractor would have to show that he has the financial resources, construction capacity, and experience necessary to do the job. It would be a system like the one which now prevails in highway construction.

Aviation officials at the meeting also observed that one of the most important jobs which face state aviation agencies is the drawing up of uniform specifications. Contractors have been invited to make practical comments on proposed specifications.

Also discussed at the meeting were possible changes in the Federal Airport Act. First, it was thought advisable that the Civil Aeronautics Administration be granted the authority to make advance payments of Federal funds. Advance payments would expedite project construction by ensuring prompt settlement with contractors for completed work. It was pointed out that the Public Roads Administration follows the advance-payment practice in highway construction work.

Another point brought up was that the Act should be amended so that more flexibility could be introduced into grants-in-aid agreements to cover contingencies that might be encountered on a job. Since the Act expressly prohibits any increase in amount once a grant-in-aid is made for a project, it was agreed that the Act should at some time be amended so that unforeseen expenses could be covered.

A third suggested change was that the wage scale for a project be established by local agreement. At present, wage scales must be predetermined by the Secretary of Labor before work can begin on a project. The time lag of up to 60 days that this involves was termed by aviation officials one of the greatest hindrances to the airport construction program.

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## Engineers' ERP Role Cited at ASCE Meet

The use of the engineering profession in administering the European Recovery Program is the "surest road to peace and the best way to insure American taxpayers of their money's worth". This view was expressed by Col. William N. Carey, Executive Secretary of the American Society of Civil Engineers, who addressed the Pittsburgh Chamber of Commerce during the Society's spring meeting held in that city April 7-9.

Col. Carey pointed out that ERP is aimed at raising the standard of living in a large segment of the world, and that a vital role in bringing about the American standard of living is performed by its engineering profession. "Moreover, the engineer can do the enormous job called for under the ERP", said Col. Carey, "with the full confidence and respect which American technological superiority has won throughout the world. The engineering profession stands ready to perform in peace as it did in war, with the American know-how which has achieved universal acclaim."

The Pittsburgh meeting of the ASCE was attended by over 800, including some 250 students from eastern colleges and universities.

Technical divisions which held sessions were the air transport, sanitary engineering and hydraulics, structural, waterways, highway, surveying and mapping, city planning, and the construction division.

## "Cornfield Contracting" Is Now "Big-Time" Job

Under the title "Cornfield Contracting on Its Way Up", a recent issue of the Mississippi Valley Contractor points out that there is more dirt to be moved on the agricultural land of this country than for levees along its river banks. Agricultural contracting may be said to have arrived, the editorial states. Its volume is on the increase, and its contractor followers are destined to achieve an expanding status in the construction industry.

The opportunity for dirt-moving contractors in this gigantic task of conserving the nation's soil was pointed out by CONTRACTORS AND ENGINEERS MONTHLY in an article on page 6 of the January, 1946, issue. Needed land-use improvements such as erosion control, terracing, pond construction, resurfacing, and contour lay-out call for tractors, bulldozers, scrapers, terracers, and similar equipment now owned by many grading and dirt-moving contractors. In the task ahead, there is both a challenge and an opportunity for contractors to develop a new phase of business and contribute to the conservation of one of our greatest natural resources—soil.

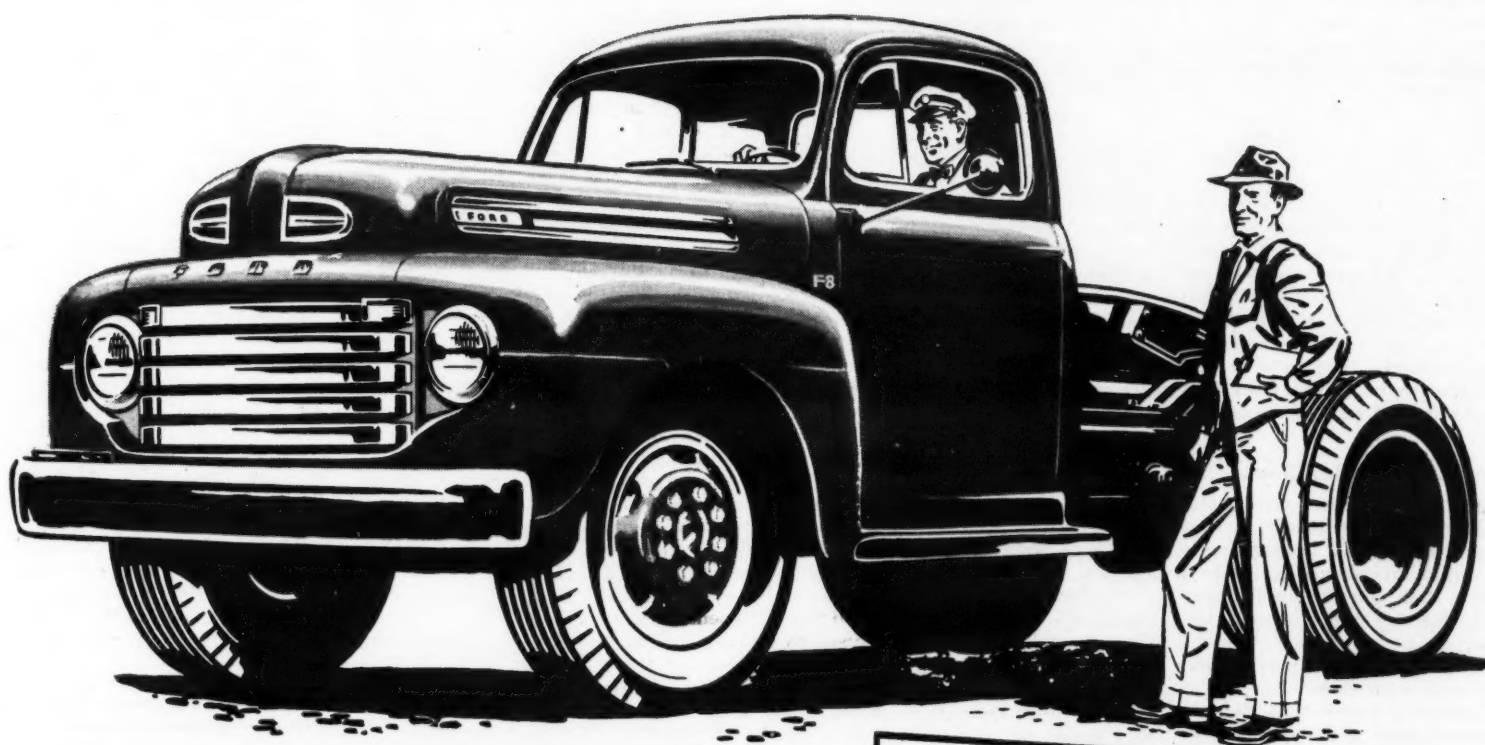
One of every seven jobs in the U. S. depends on highway transportation.

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**\*BONUS:** "Something given in addition to what is usual or strictly due."—Webster

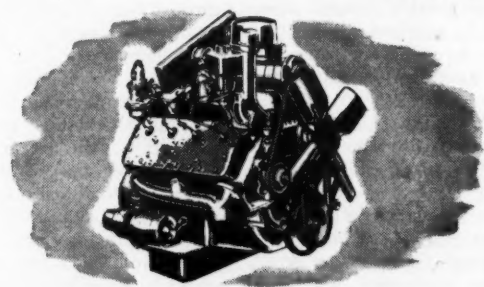
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# Concrete Road and Bridges Are Part of New Expressway

## Narrow and Wide Strips On Four-Lane Divided Highway Call for Two Sets of Paving Equipment

✦ DESPITE rain and bad weather, concrete paving was pushed ahead successfully on Texas Route 35 just south of Houston. By mid-April, Gulf Bitulithic Co. of Houston had finished some 1.88 miles of new four-lane divided expressway started in May of last year. The \$479,017 contract with the Texas Highway Department provided for a stretch of high-capacity divided highway leading in to the new Houston Expressway, also under construction.

The chief reason that intermittent rains did not interfere too much with the job, aside from the time they were actually falling, was that all the 4-inch select sand-shell flexible-base material had been hauled in, compacted, and sealed. The working area was therefore stable when bad weather came.

For some years now, Texas Route 35 has carried heavier and heavier traffic to and from Galveston and other southern Texas cities. With the new Houston Expressway now under construction, it was desirable to carry this southern traffic to and from the expressway as rapidly as possible. The new project will eliminate any bottleneck from Sims Bayou towards the new city expressway.

### Four Lanes in New Road

The new improvement consists of two 32-foot curb-to-curb lanes, divided by a 24-foot esplanade. The esplanade is a raised dividing island with curbs 4 inches high. Both concrete traffic lanes fair off to meet 7-inch curbs at the street line.

Concrete pavement is 8 inches thick, and reinforced with steel mesh in the center. There is a 4-inch-thick flexible base, built of sand and oyster shells. The earth subgrade below the sand-shell base was built up to 95 per cent of density by sheepfoot and pneumatic-tire rollers. Both the earth subgrade and the surface of the sand-shell flexible base are sealed with an application of OA-30 asphalt, applied at the rate of 0.4 gallon per square yard. This seal is designed to keep water out of the flexible base.

Paving machines had to be widened or cut down, as required, to arrive at proper widths. One set of paving equipment poured a lane 24½ feet wide; the other laid down a lane 8½ feet wide. The two widths, joined together by a keyed longitudinal construction joint, make a 32-foot pavement with two curbs 6 inches wide.

### Organizing the Job

Bill Cape, President of Gulf Bitulithic Co., and General Superintendent Ivar

By RAYMOND P. DAY,  
Western Editor

Jones picked V. W. Homesley, one of the company's experienced and long-time paving superintendents, to organize and supervise the field work in connection with highway paving. Homesley, a big, genial Texan, has pushed paving and dirt jobs now for a quarter of a century.

Faced with about 60,000 cubic yards of grading, 16,964 tons of flexible-base compaction, and 16,500 cubic yards of concrete paving, Homesley set the job up to roll rapidly and efficiently.

He moved in first with two Caterpillar D7's, each pulling an 8-yard LaPlant-Choate scraper, to start the stripping and grading. A D6 Caterpillar with a 6-yard LaPlant-Choate scraper joined up within a day or two. A Lorain 40 dragline with four dump trucks helped out on one section where the quantities of earth had to be hauled about a mile to a disposal area.

As the dirt left the scraper bowls in lifts under 6 inches, a 1,200-gallon water tank truck sprinkled the material whenever it was dry. The lifts were then rolled immediately by a Grace sheepfoot roller behind a Caterpillar D7. Two double units, used in tandem, mashed the earth subgrade down to densities not less than 95 per cent of laboratory optimum.

Some of the dirt subgrade was also compacted by two Tamco P-10 pneumatic-tire rollers. The subgrade was checked every 50 feet by three survey blue-tops, and dressed exactly to those blue-tops by two Caterpillar No. 12 motor graders assigned to the job.

The select sand-shell sub-base material, dredged up from the Houston ship channel by a commercial producer of this material, was then brought in by dump trucks. It was laid down on the roadway after the surface of the earth was sealed off with a shot of asphalt membrane. A Littleford pressure distributor shot the OA-30 at a temperature of from 400 to 425 degrees, to put down about 0.4 gallon per square yard. This membrane cooled and solidified almost immediately on application, and resisted a dust coat of sand with stubborn tenacity.

The sand-shell sub-base material was spread out carefully by the motor graders, and then rolled by sheepfoot rollers until it was dense and solid. The surface of the sub-base was then sprinkled and slush-rolled by the pneumatic-tire machines to put all possible density and smoothness in this part of the job. Here too the sub-base was checked by survey blue-tops every 50 feet, and dressed carefully by H. L. Freer. Freer was the Subgrade Foreman, but he is also one of the old-time motor-grader operators who came into

(Continued on next page)

## Two Concrete Structures Identical in Design to Carry the Traffic on New Express Highway

✦ CONSTRUCTION of the Sims Bayou Bridge and approaches on Texas Route 35 near Houston was one of the important features of the Gulf Bitulithic Co. contract for the Texas Highway Department. The new bayou crossing, which consists of two concrete bridges placed side by side, was done at a contract cost of \$105,116.

The old concrete bridge which carried automobile traffic across the bayou at this point was built back in 1924, and had been obsolete for some time. That structure has now been replaced with modernistic reinforced-concrete bridges, each of which has a 28-foot finished roadway deck.

Each bridge is 200 feet long and measures 32 feet wide from outside to outside. Support for the flat-bottom reinforced-concrete deck slabs consists of six piers and two abutments in each bridge. Each pier consists of two reinforced-concrete columns 24 inches square, resting on concrete footings 5 x 5 x 2.5 feet. Four concrete piles 14 inches square, ranging from 21 to 35 feet in length, give 145 tons of bearing each to take the load. They tie in to the footings. A 24-inch square concrete cap across the tops of the columns carries the bridge deck.

From each abutment, the new bridges were built monolithic for 50 feet, with expansion joints in the deck slab outward from those points.

The heavy flow of traffic was handled first by the existing bridge, with construction going ahead on the north unit of the new twin structures. When the

first of the two new bridges was finished, it carried the traffic while men and equipment moved in to demolish the old bridge and erect the other new one. The south unit occupies generally the area of the old bridge.

Work which began May 14, 1947, had completed the first unit to a point where it could be used by traffic on November 15. The two new units were to be completed by April 1, 1948.

### Footings Set on Piles

The permanent concrete bearing piles, and the temporary wood falsework piles which carried the deck formwork, were driven by Leslie Watson, Dallas subcontractor. He used a steam-powered skid rig, and moved the rig along on caps over the temporary piles. A Vulcan No. 1 pile hammer was used to drive these piles.

All exposed concrete faces were formed with Masonite. Substructure concrete was, of course, not given this careful attention. All piers, caps, and the exposed sides of the 14-inch bridge deck were given a thorough stoning with Carborundum finishing tools after the forms were stripped. Falsework had to stay in place at least 21 days after the pours were made, before stripping was allowed.

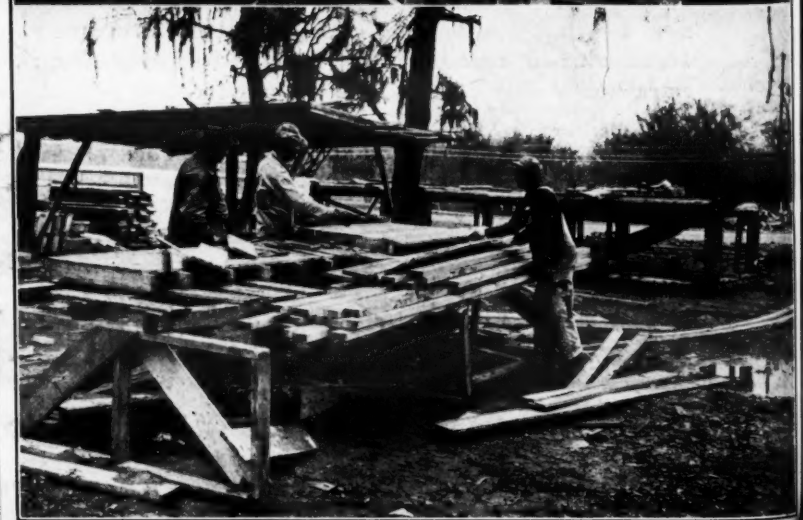
A Rex 27-E paver mixed and placed the bridge concrete. Batch trucks from the central plant for this and the highway paving job brought the Class A concrete materials in, dumped to the paver skip, and the mixed concrete was then placed by the paver bucket without further re-handling. The slabs next to the abutments were poured first; then the heavy equipment moved farther out as soon as curing permitted.

The old bridge was demolished by a steel drop hammer, handled by a Lorain 40 crane. The same machine then loaded the crushed material with a dragline or a clamshell bucket.

Although rain fell throughout the winter, no serious flood damage was reported, and the two bridges were built rapidly and efficiently. I. B. Menton was the Bridge Superintendent.

With the first of the two new bridges across Sims Bayou completed, a Lorain 40 crane with a steel drop hammer demolished the old concrete bridge (top photo). Below, Bridge Superintendent I. B. Menton, left, watches two carpenters build a pier form.

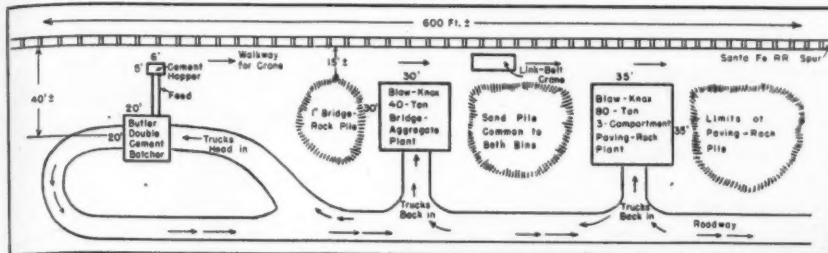
C. & E. M. Photos



C. & E. M. Photo

To get rid of a rain-water trap, this Caterpillar No. 12 motor grader is smoothing the 24-foot esplanade which divides the new Texas expressway section.





C. &amp; E. M. Diagram and Photo

One batch-plant set-up, diagrammed above and pictured at right, with one crane handled all aggregate and sand batching for the Texas Route 35 paving job, as well as the bridge job at Sims Bayou. The plant handled about 325 batches a day; if it had been required to work at capacity, it could have handled 500 batches.

his own before the war, instead of being made with it. Freer took personal charge to put all fine-grade work down to close tolerances. Texas Highway Department engineers allowed only a 1/2-inch tolerance in 50 feet, but Freer met that requirement often with room to spare.

Before sealing the sub-base, Homesley used a Carr Formgrader to excavate his form trench for the 4,000 road-feet of Heltzel steel forms he was to use later. The Formgrader cut the trench about 1/2 inch low, after which the sub-base was sealed with another shot of OA-30, applied at the same rate as that which sealed off the subgrade.

No other machine touched the subgrade. It was all dressed to exact tolerance by the motor graders.

#### Erecting the Batch Plant

One of the most important parts of the job organization was the erection of a central batch plant, where concrete aggregates and cement were proportioned and sent out to the highway and bridge job.

The plant was set up on a spur line of the Santa Fe Railroad, with a 2-mile dead haul to the center of the job. A 3-compartment Blaw-Knox aggregate bin, holding 80 tons, was set up to weigh out the paving aggregates and sand. A 40-ton 2-compartment Blaw-Knox bin was brought in to handle bridge aggregate and sand. Farther down the Santa Fe spur, a Butler cement bin with two weighing compartments went up. A clear roadway about 15 feet wide was provided between the bins and the railroad track, for the Link-Belt 1 1/2-cubic-yard crane which charged both aggregate plants.

Sand and two sizes of aggregate were shipped in by rail from the Texas Construction Materials Co. plant in Columbus, Texas, and spotted at the siding. The paving aggregate was clammed out to a stockpile east of the big Blaw-Knox bins. Sand was stocked in a big pile common to both batching bins, and the smaller Class A bridge aggregate was stockpiled on the west side of the small aggregate bin.

In this way, one batch-plant set-up with one crane handled all aggregate and sand batching for the paving project, as well as the bridge job at Sims Bayou. Because this job had natural slowdown obstacles in the form of curbs and other transitions, the plant was never required to operate at its rated capacity of 500 batches per day. Ordinarily it handled about 325 batches per day, each batch containing 40.8 cubic feet on the biggest pours.

Lone Star portland cement was used. It arrived in bulk by way of railroad boxcars, and was unloaded by a Fuller-Kinyon cement unloader to a small 25-barrel transfer hopper along the railroad track. A Waukesha-engine-driven feed then sent the cement up to the weighing hoppers of a two-compartment Butler cement bin, where two batches could be dumped simultaneously to cut truck time to a minimum.

A Jaeger air compressor stood by at all times at the cement bin to clean the cement unloader each day, and to keep the cement bins clean. This kind of careful day-to-day attention kept cement from caking on the equipment, and insured the good working condition

of the machines. That kind of equipment care, in fact, was a characteristic of the entire job.

(Continued on next page)



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# Lorain TL-20





C. &amp; E. M. Photos

A shop-built strike-off screed at the front of a Jaeger-Lakewood finisher, left, is inspected by V. W. Homesley, Paving Superintendent on the Gulf Bitulthic Co. job. Above, workmen spray Hunt Process curing solution on a section of finished slab.

## Concrete Pavement For New Expressway

(Continued from preceding page)

Ten Ford 1½-ton trucks were rented on a batch basis and used to haul the concrete. Each truck carried two batches. The trucks backed under the aggregate batchers and received each batch of sand and aggregate at one dump. They then headed out, passed under the cement bin to take their cement, and drove on out to the job.

The paving concrete was batched according to this formula:

Rock aggregate, 2-inch-minus	3,332 lbs.
Sand	1,779 lbs.
Cement	635 lbs.
Yield	40.8 cu. ft.

### Preparing to Pour

Concrete was placed first in the 24½-foot inner lane nearest the dividing esplanade. Then the crew moved out with a smaller paver and finisher to pour the narrow lane next to the gutter.

To pour the 24½-foot strips, the Heltzel steel forms were set generally about 1,000 road-feet ahead of the paving equipment set-up. This distance was about all that could be poured in one day, so it gave a full shift of form work in the clear at all times.

A crew of 8 men was used to set, stake, and align the forms. These forms were set true to a string line, and leveled up with light shoveling of sand underneath the base. Because of the asphalt membrane, heavy tamping was not allowed.

Form oil was then applied with an orchard spray, and the 2-inch lumber backing to hold the raised curbs was set on top of the steel forms and held in place by C-clamps.

A wooden keyway was also bolted on the outer form, in order to form the longitudinal keyed joint to tie the two strips together.

This pavement had a number of various joints. A longitudinal weakened-plane joint in the center of the 24½-foot slab was formed with a Flex-Plane machine, and the load transfer was taken by ½ x 36-inch steel tie bars placed on 24-inch centers. These tie bars were laid on the wire reinforcing mesh and placed when the reinforcing went in.

Warping joints, on 15-foot centers, were also cut with the Flex-Plane machine, and were strengthened by ½ x 36-inch steel tie bars spaced on 13½-inch centers. These tie bars also were placed with the steel reinforcement.

Expansion joints, every 45 feet, called for ¾-inch redwood 7 inches thick and full width across the pavement. Star Lugs on 13½-inch centers gripped the redwood, and tied in to the concrete about 2½ inches off the sub-base. The

redwood arrived on the job in 4 and 3-inch widths, and was assembled with Star Lugs on a jig in the main yard. These were then trucked out to the job and set in place as paving progressed.

**Pouring Concrete**  
The 24½-foot slabs were poured by a MultiFoote 34-E single-drum paver, carrying a 20 per cent overload. This machine was equipped with a 35-foot  
(Concluded on next page)



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boom, and could reach any part of the wide slab with its bucket. It crawled down the center of the sub-base between forms; batch trucks either used the intersections, or two sections of steel forms were left out about every 300 feet to allow them to get in to the paver.

Mixing water was hauled by a Ford truck with a 1,100-gallon water tank, and transferred to a 1,500-gallon tank trailer. This trailer had to be spotted on the shoulder and towed by a tractor whenever the wide pours were being made. The water was removed from the trailer by the paver pumps. Only about 60 feet of suction hose was necessary to transfer the water.

After a mixing time of 50 seconds, the concrete went out to the end of the MultiFoote paver boom, where the bucket dumped it on the sub-base. The concrete was spread out as evenly as possible by the paver, but only to about half the pavement thickness.

At this point a Jaeger-Lakewood finisher moved up with a shop-built strike-off screed suspended by a winch on its front end. The heavy piece of steel could be lowered 4 inches below the top of the forms, and used to level off the concrete at that point. After moving up about 15 feet, this machine lifted the screed and backed away. Four men then carried in the 12 and 12½-foot mats of 6 x 6 x ¾ reinforcing mesh, each 15 feet long, laid them in place with the tie-bar steel right for the joints, and the paver then covered this material with the remainder of the concrete slab.

In the paving line-up behind the MultiFoote 34-E, in order of their appearance, were a Jaeger-Lakewood finisher, a Flex-Plane machine for cutting joints, a Koehring Longitudinal Finisher, a joint-dressing bridge, a striping machine for applying the center stripe, and a Flex-Plane curing machine.

The Jaeger-Lakewood finisher had two laborers who operated the screed winch and kept the concrete puddled along the front end. One man with an electric vibrator also vibrated both edges thoroughly, and every expansion joint. The Flex-Plane strips were laid in behind the Jaeger-Lakewood machine, just ahead of the Koehring Longitudinal Finisher. It was this machine which put the final mechanical finish on the slab.

Three finishers, working with long-handled wooden bullfloats and edging tools, then dressed the surface of the slab and edged all joints. Three other finishers were used with a labor crew to buggy extra concrete back to build the curbs. The 2-inch wood forms back of the curbs were set up just as soon as the machine line-up passed by. A final finish was put on the slab by pulling a belt crosswise.

The center stripe was put in as the concrete slab was poured, from a special bridge. Specifications called for from 3 to 4 pounds of black magnetic iron oxide per 100 feet of 6-inch stripe, and required that this material penetrate the concrete slab from ¼ to ¾ inch.

The coloring material was fed in through a slotted opening 6 inches wide, and troweled into the concrete thoroughly with a wood float. Magnetic iron oxide has a strong affinity for concrete, and penetrates easily.

Hunt Process Clear curing solution was used on all the job. It was applied by the Flex-Plane curing machine.

The forms were stripped and moved ahead each day. Pins were extracted by a shop-built pin puller, the forms were loaded to a flat-bed truck, and moved ahead to where they were to be used again.

#### Narrow-Lanes Equipment

While the same general scheme of concrete work was followed on the narrow 8½-foot outer lanes, the equipment

was different. Superintendent Homesley had another set-up of equipment for pouring the narrower strips.

A MultiFoote 27-E paver was used here, overloaded 20 per cent to take a 32.4-cubic-foot batch. A Blaw-Knox Ord finishing machine, cut down to 8½ feet, was used in exactly the same way the Jaeger-Lakewood machine performed on the wide strips. Reinforcing steel mats were only about 8 feet 3 inches wide to allow room to clear between the forms. Hand bullfloats were used to finish the concrete surface, and the Hunt Process solution was applied by means of a long-handled spray bar.

#### Fine Finishing Required

One of the interesting practical problems here was a maximum grade of only ¼ of 1 per cent on the whole job. Surveys and finished work had to be extremely precise, so that rain water would drain off properly into the gutters at the sides of the slab. To men who were used to wide-open road building on Texas range land, here was



C. & E. M. Photo  
W. W. Homesley directed the Gulf Bit-  
umithic paving job on Texas Route 35.

a job which taxed all patience because of the tedious and precise nature of all

reference marks. There was no room for error.

Under Homesley's supervision, the new concrete job was rushed rapidly ahead to completion. The upper end ties in to the new Houston Expressway temporarily by a penetration-asphalt-surfaced service road, pending final design on the approachway and the construction of the main expressway at that point.

#### Personnel

The job was designed and administered under the general supervision of D. C. Greer, Texas State Highway Engineer, with Jed N. Robinson as Construction Engineer. Jim Douglas is District Engineer of District 12, with headquarters at Houston, and has general charge of the work. Cooper Dewey was the Resident Engineer on the job.

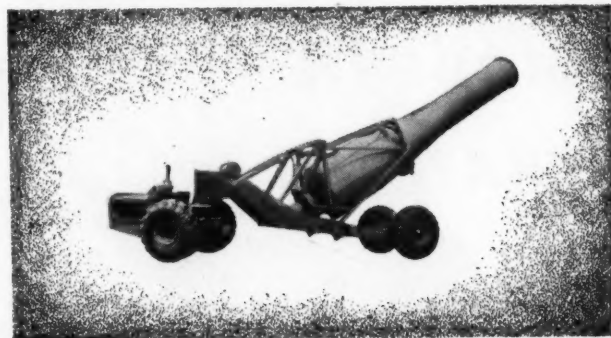
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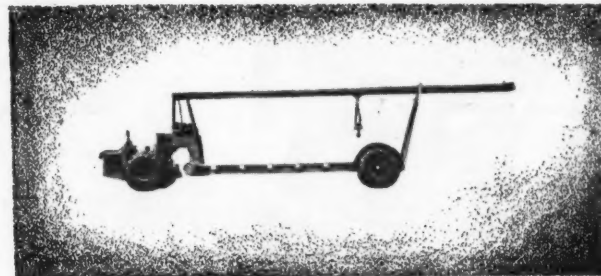


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Porter-Cable's new radial saw, Model RS, has a 27-inch-long stroke. It can be set at any angle and to any desired depth, and is available with either a 1 or 2-hp motor.

### New Radial-Arm Saw Cuts Many Materials

A high-speed radial saw designed for cutting wood, plastics, and some composition materials is made by the Porter-Cable Machine Co., 1714 No. Salina St., Syracuse 8, N. Y. The Model RS saw is powered by a light-weight ac/dc 25 to 60-cycle motor which can be furnished in either 1 or 2-hp ratings. Spindle speed is 8,000 rpm.

The saw blade is 12 inches in diameter to permit a 4-inch cut. It is adaptable for cross cutting, gang cut-off, angle cut-off, bevel cutting, compound 45-degree cut, dado cutting, and ripping operations. The motor unit is set vertically to accommodate cope heads, shaper heads, dado saws, and groovers. The saw can be set at any angle, and a dial indicates the degree of setting.

The saw can be set to any desired depth and locked in position. A special feature of the Model RS radial saw is its 27-inch-long stroke. Cut-off capacity at 90-degree back fence is 20 inches; at 90-degree front, 15½ inches; the saw head can be raised 7 inches; maximum rip capacity to the front fence is 21½ inches, to the back fence it is 26 inches. The table measures 17 x 46 inches and is 31½ inches from the floor. Net shipping weight, including a 2-hp motor, is 260 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 17.



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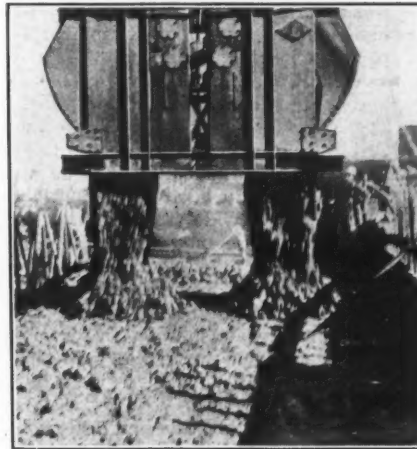
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### Controlled Discharge Is Feature of Bucket

A new type of concrete-pouring bucket has been developed by the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh 22, Pa. It is designed in a rectangular shape, and has air-operated roller gates with controllable discharge. In larger sizes, the buckets are made up of two units coupled together so that concrete can be poured in two piles to conform with U. S. Engineers specifications.

These new specifications for placing mass concrete in structures such as dams require that concrete buckets have vertical sides, a full opening at the bottom, and that the discharge shall be controllable. An additional limitation prohibits the use of an 8-cubic-yard bucket for cableway operation where the entire load would be discharged in one pile.

According to the manufacturer, this bucket can be used with all types of cement, aggregates, and slump con-



This is the original 8-cubic-yard rectangular concrete-paving bucket built by Blaw-Knox for demonstration at Allatoona and Wolf Creek Dams. At left, it discharges into two separate 4-cubic-yard piles. At right, it is shown suspended from the cableway with its two large air-operated roller gates in view.

sistencies. It is made in 2, 3, and 4-cubic-yard sizes; dual 3 and 4-yard sizes make up 6 and 8-yard models.

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## Big Railroad Docks Are Built at Lake Port

(Continued from page 1)

Immediately behind the docks the track yard is over 1,200 feet wide, but this gradually narrows down to an average width of about 500 feet.

Also included in the project is the dredging of 2,600,000 cubic yards of material from the waters surrounding the docks, and extending out about 700 feet from the ends of the docks to the 500-foot-wide navigation channel. The dredging went down 27 feet below mean low water, the same depth as the ship channel which extends up the Maumee River from Lake Erie. This part of the project was sublet to the Great Lakes Dredge & Dock Co. of Cleveland. The bulk of the dredging was done by the dredge Mogul of Duluth which was equipped with a 12-yard dipper for a digging tool.

### A Deal in Superlatives

Besides the 2,600,000 yards of dredging excavation, the project has a few other major items that fall in the superlative classification. For the dock wall 305,000 linear feet of steel sheet piling weighing 12,000 tons was required. An additional 2,000 tons of steel was used in bracing and tying the bulkhead together. Structures and anchor walls accounted for 30,000 yards of concrete. About 10,000 untreated-timber piles were driven, totaling 500,000 linear feet. Strung out along a former creek bed, the marshy site required 1,500,000 cubic yards of borrow before the fill was brought to grade and the docks leveled off with the top of the walls. Over 56 miles of track and 225 turnouts were laid through the storage yard and running out on the docks. Across the width of the yard the average number of storage tracks was 26; these were spaced on 13-foot centers.

At one point in the yard this expanse of track narrows down, hourglass fashion, to only 5 tracks, in order to pass under a new bridge which is part of an access road leading to other loading docks located west of the new construction. These Presque Isle piers also lie at the mouth of the Maumee, and can accommodate 4,500 railroad cars and 16 lake vessels.

The access-road bridge is a 3-span structure, 180 feet long, with two abutments and three piers of reinforced concrete supported on timber piles. The 8-inch reinforced-concrete deck is supported on 36-inch I-beams. A pedestrian walk runs along one side.

### Sheet-Pile Bulkhead

The MZ-38 sheet-pile sections forming the dock bulkhead walls are 55 feet long, and were driven by a McKiernan-Terry 11-B-3 double-acting steam hammer hung from a Northwest crane with a 110-foot boom. The crane worked from a land fill. A Northwest and a Marion crane, each with a 60-foot boom, worked along with the driver. One moved and set the template frame into which the other crane strung the sheeting, so that the big rig had nothing to do but drive the piling. After the sheeting was driven, a pair of 12-inch x 25-pound channels were bolted along the back to serve as wales. For a bulkhead



C. & E. M. Photo

This is the railroad yard that extends back from the pier job which Walsh-Bates & Rogers Construction Corp. is handling for the Lakefront Dock and Railroad Terminal Co. in Toledo, Ohio, on the shore of Maumee Bay.

cap 15-inch channels were fastened to the top of the sheeting.

Where the docks are less than 275 feet wide, the opposite wall sections were

tied together by 2 3/4-inch rods placed on 6-foot centers. As the docks taper out and widen to the rear, the effective distance between walls is too great for the

tie rods. Consequently concrete anchor walls were constructed within the docks about 70 feet back from the sheet piling, and the tie rods were strung between the concrete wall and the steel bulkhead. The space within the bulkhead was then filled with dirt borrow.

Where structures such as utility buildings, storage buildings, substations, car unloaders, car retarders, towers, etc., are built on the docks, they are supported on timber piles. The latter were driven with a Vulcan No. 1 single-acting hammer hung from one of the crane booms. The many fender piles along the docks were also driven by this hammer.

Every 50 feet immediately behind the bulkhead a 50-foot Monotube steel pile was driven and filled with concrete. This was capped with a 3 1/2-foot square block of concrete which was topped with a steel pipe to serve as a mooring post for the lake vessels. These caps were anchored either to the back concrete wall or to a block of concrete sup-

(Continued on next page)

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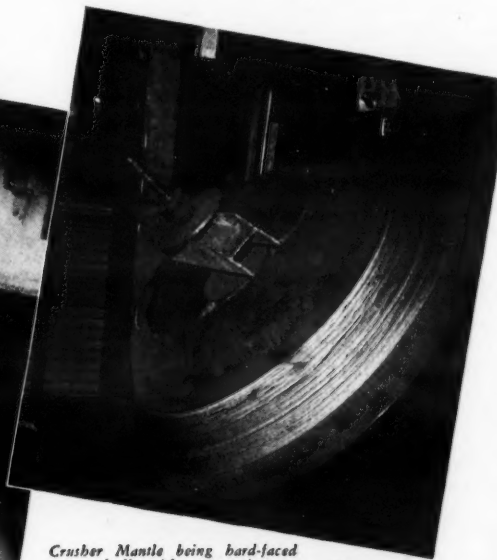


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## Big Railroad Docks Are Built at Lake Port

(Continued from preceding page)

ported on a 3-pile cluster. The 1¾-inch rods were used for ties.

### Dirt Work

When the job was started, Otter Creek meandered down the center of what is now the track storage yard, and the ground on either side was a swampy muck. Draglines dug out a new channel along the west side of the yard into which the creek was successfully diverted. Then the swamp was filled in with dirt from borrow pits, forcing up the soft muck in the form of mud waves. As the mud came to the top the draglines completely removed it and it was hauled to a dump and wasted. Half a dozen draglines—Northwests, Marions, Limas, and Lorains—with 1¾ to 1¾-yard buckets worked either in the swamp or in the borrow pits loading the earth-moving equipment.

The bulk of the 1,500,000 yards of borrow came from three pits with hauls varying between ¼ and 1 mile. Much of the dirt moving was sublet; Paul Jeffers of Waterville, Ohio, and the Billy Baker Co. of Toledo, handled sizable yardages. An average of 50 trucks and trailers did the hauling, with loads running up to 18 yards. When the material was dumped, it was spread out by dozers and compacted solidly by the heavy equipment running over it. For short hauls within the job area, tractor-scraper units were employed on some of the dirt-moving. The contractor's equipment on the project was powered and lubricated with Gulf products.

By May, 1947, the sheet piling for the docks was completed, and by the end of the summer the dirt work was also pretty well finished. The railroad companies supplied all track materials including cinders for the track ballast, along with the ties, rails, and fittings, but the actual construction was done by the contractors.

### On the Docks

A separate contract was awarded by the Railroad Co. to Heyl & Patterson Co. of Pittsburgh, Pa., to manufacture and erect a new coal dumper on pier 2, the middle dock. This giant structural-steel loader was completed and functioning by the end of '47. With huge clamping devices it can pick up a 120-ton loaded coal car, reach out over the dock, and dump its contents into the hold of a lake vessel. Then the empty car is sent down on a trestle which returns it to the ground from its elevated position. When the car reaches the ground, its momentum carries it up another trestle called a retarder, and as the car rolls back down it is switched off to the tracks where the empties are picked up and hauled from the yard.

The two existing dumpers used by the New York Central and the B & O Railroads in the heart of the city will be moved and erected on the new site—one, in fact, was moved last winter. One will be set up on pier 2, on the other side from the new structure; the other dumper will be installed on pier 1, along the west bulkhead wall.

Westerly dock 3 will handle not coal but iron ore on an unloader. The pier can accommodate 108 ore cars, 40 feet long. Here the ore carriers from Minnesota's Mesabi Range will transfer their cargo to railroad cars for shipment farther east, and pick up a load of coal consigned to lake ports at which they will call on their return voyage west.

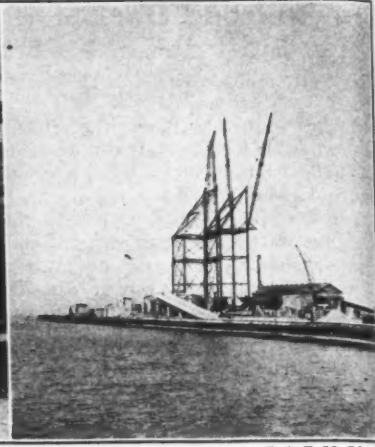
### Quantities and Personnel

The major items in the Toledo dock project were:

Dredging	2,600,000 cu. yds.
Excavation	105,000 cu. yds.
Borrow	1,500,000 cu. yds.
Steel sheet piling	305,000 lin. ft.
Other steel	2,000 tons
Timber piling	500,000 lin. ft.
Concrete	30,000 cu. yds.
Track	275,000 lin. ft.



An average force of 500 men is employed on the project by the Walsh-Bates & Rogers Construction Corp. H. H. Dugan is Project Manager; L. J. Bullen is Assistant Project Manager; and Stephen C. Richards is General Superintendent.



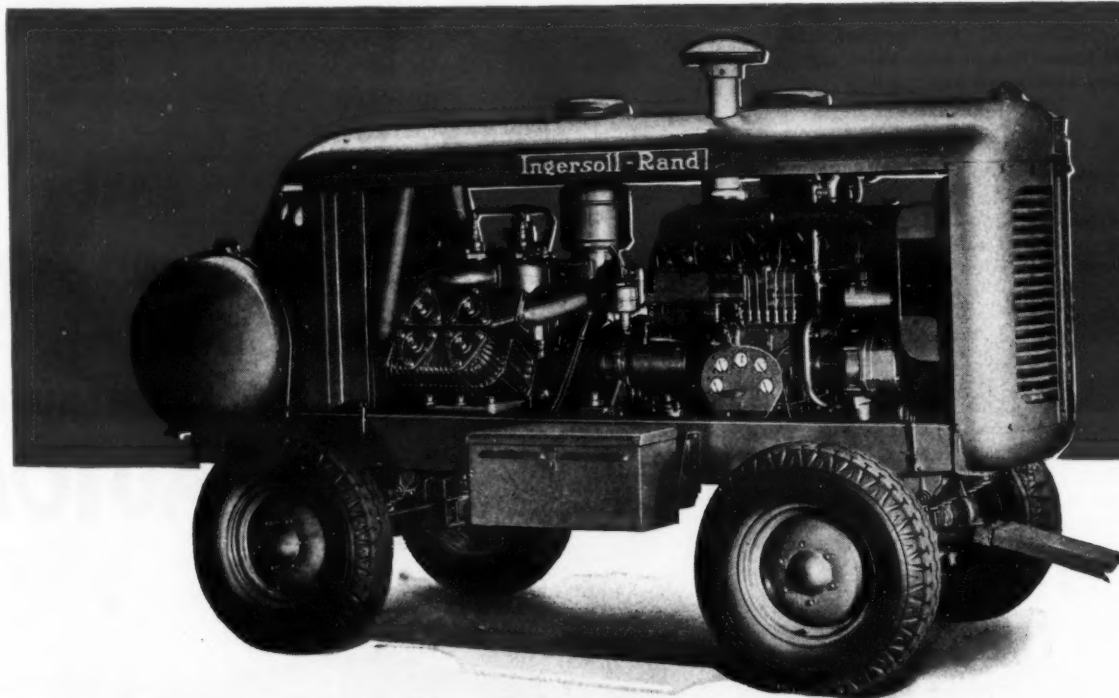
C. & E. M. Photos

Looking north on pier 3 in the first photo, we see tie rods extending back from the sheet piling to the concrete foundation wall. Fender piles are being driven at the far end. The second picture shows pier 2, where a coal dumper is being erected.

### Dredging

Dredging of the 2,600,000 cubic yards of material along the docks and out to the ship channel started on July 25,

1946. By the end of 1947 it was fairly well completed, although some clean-up work will be done through 1948 where  
(Continued on next page)



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filling-in has occurred.

In the beginning the average depth of water in this area was only 2 feet, and one island which had to be removed was 8 to 10 feet high above the level of the water in Maumee Bay. All the dredging was done to a depth of 27 feet below low water, and included the entire area of slips No. 1 and 2 lying between the three docks, and a 150-foot strip along the west side of dock 3. The east side of dock 1 is not being dredged. From the docks the dredging limits flare outward until the cut is 3,000 feet long when it meets the ship channel.

At various times for short intervals the Great Lakes Dredge & Dock Co. used some clamshell dredges to open up pilot channels which were about 50 feet wide x 15 feet deep. But the subcontractor did the bulk of the digging with the dredge Mogul of Duluth, which had a 12-yard dipper. With the total crew of 35 working three shifts a day for 6 days a week, the Mogul averaged 70,000 yards of excavation over that 6-day



C. & E. M. Photos

The Mogul's 12-yard American-Manganese bucket, at left, dumps a load into a scow during dredging on the Toledo dock job. Above: the Mogul's Captain W. C. Farrish (left) and Chief Engineer John Hoynosh.

stretch. The excavated material, a heavy clay, was loaded into scows which were towed out to deep water at the west end of Lake Erie and dumped.

#### The Mogul

The all-steel hull of the Mogul was constructed by the Manitowoc Shipbuilding Corp., of Manitowoc, Wis., in

1929. It is 156 feet long, with a beam of 42 feet 6 inches, and is 12 feet 8 inches deep. The plates are  $\frac{3}{8}$ -inch, and in parts where added strength is needed this thickness is increased to  $\frac{1}{2}$ -inch. The wooden superstructure is painted red, trimmed with white, and the whole craft both inside and out is as clean and spick and span as it was when the vessel was first put into service.

In the hold just below the level of the main deck and aft of amidships is the main engine, a Busch-Sulzer 2-cycle 8-cylinder air-injection diesel engine with a Ward-Leonard control. It drives four General Electric generators, just forward of the engine, one 300-kw, one 100-kw, and two 75-kw units. Along the starboard side of the engine room are two stand-by auxiliary engines. One of these, a Fairbanks-Morse 120-hp solid-injection diesel, drives a G-E 75-kw generator. The other, a Hill 12-hp 4-cycle diesel, drives a G-E 8-kw generator. The latter unit is used primarily for starting the main engine and pumping the compressed air.

Slightly forward on the starboard side of the engine room are the daily fuel-supply tanks for the diesels. The vessel carries 96,000 gallons of Sohio 28-30-Baumé fuel oil supplied by Standard Oil of Ohio, and 14,000 gallons of lubricating oil furnished by Socony-Vacuum. In a day's run from 600 to 660 gallons of diesel oil are consumed.

On the opposite side of the room is the switchboard where the electric power from the generators may be directed to any of the G-E operating motors. Other equipment within the deck house aft includes various pumps, and a 100-hp boiler for heating water.

#### Operating the Dredge

All the operating machinery for digging is of Bucyrus-Erie design and construction. In the forward part of the main deck house is a hold from which machinery may be removed by lifting it out on a Brown 25-ton hoist rolling overhead on an I-beam rail. Beyond the hold towards the bow is the 75-hp swing motor that operates the two  $1\frac{1}{4}$ -inch cables which control the 24-foot-diameter swing circle from which the dipper works. This permits the dredge to make a cut from 30 to 35 feet wide.

At the bow is a 50-foot-high A-frame supporting the shovel boom which, together with the thrust machinery, weighs 70 tons. At the end of the 58-foot dipper stick is an Amsco 12-yard bucket which digs out a chunk 6 feet wide at each bite. A 375-hp motor operates the main hoist on the dipper which has a maximum bail pull or lift of 150 tons. A thrust machine that holds the dipper up against the bank where it is digging is powered by a 75-hp motor.

Three spuds play an important part in the operations of the dredge. Two of these are at the bow within the hull, one on the port and the other on the starboard side. The third fits in a slot at the center of the stern, and is pivoted so that it may trail when the dredge is being moved. The spuds are made of cast steel 75 feet long and 44 inches square. At the bottom of the forward spuds are steel footings, 10 feet square x 30 inches deep, with a 6-inch bevel around the edges. This broad base prevents the spuds from sinking into a soft bottom when the dipper is lifting out a 12-yard bucket load of dirt.

A 75-hp motor lifts out the forward spuds, while the stern spud is raised by a 60-hp motor. The spuds are hooked to  $1\frac{3}{4}$ -inch cables, while the main hoist lines are  $2\frac{1}{4}$ -inch. Roebling wire-rope cables are now used throughout on the Mogul.

When the dredge is ready to move ahead after completing a cut, the dipper is set ahead as far as possible, the forward spuds are raised and the stern spud loosened so that it will trail. Then by means of the extended bucket the dredge pulls itself ahead 18 feet at a

(Continued on next page)

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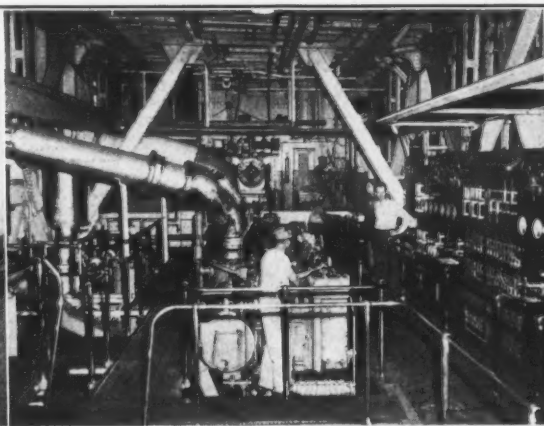
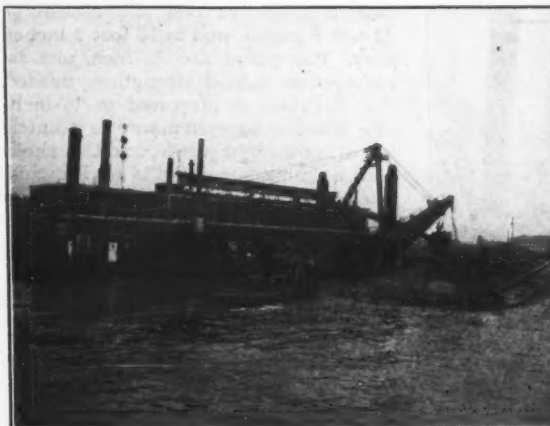
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FOR ALL CONTRACTORS' EQUIPMENT





C. &amp; E. M. Photos

## Big Railroad Docks Are Built at Lake Port

(Continued from preceding page)

time. Control over the line of excavation is maintained by the establishment of range lines on the shore set 30 feet apart. Lights are placed on top of these ranges for night work.

### Machine Shop

In the forward part of the main-deck housing, the units of a well equipped machine shop are grouped around the swing motor in the center of this space. Along the starboard side is a Rahn-Larmon 18-inch x 8-foot lathe, and a workbench with vises and small tools. On the port side opposite are a Rockford 2½-inch drill press, a Steptoe 24-inch shaper, a 20 x 2½-inch grindstone, and a 12 x 2-inch emery wheel. Rounding out the equipment are oxyacetylene welding units and a Lincoln 300-amp electric welder.

Every week the points on the dipper are removed and replaced with other points, while the ones just removed are given a surfacing with Stoddy hard-facing alloys.

The crew of the Mogul is quartered on the upper deck.

### Floating Equipment

The dipper dredge loads directly into bottom-dump scows which are moored alongside the Mogul. Six steel scows holding 1,500 cubic yards each are used. They measure 220 feet long, have a beam of 45 feet, draw 5 feet of water light and from 12 to 15 feet when loaded. Two tugs are used to haul the scows, two in each tow, 13 miles out in the

Lake to deep water where they are dumped. The round trip takes 7 hours. By using two tugs and six scows, there is always an empty scow on hand so as not to keep the dredge waiting with a full bucket to unload.

One of the tugs is the William A. Lydon, 90 feet long, 25-foot beam, and

powered by a 750-hp diesel engine; the other is the William P. Feeley, also a 90-footer with a 30-foot beam, and driven by an 850-hp steam engine. The

fleet also includes the launch Beaver State, a 43-foot 60-hp diesel service boat which brings supplies to the dredge

(Concluded on next page)

## LUBE MEMO

*Crankcase Sludge causes Hot Lube Oil troubles*

*Hot oil oxidizes fast, gums pistons*

*Sludge formed by ordinary lube oil insulates crankcase, keeps oil hot*



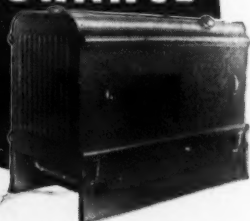
*Foreman says try RPM DELO Diesel Engine Lubricating Oil — its compounds stop sludging 3 ways:*

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*Tell foreman OK to order RPM DELO Oil*



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and ferries the crew back and forth to shore.

The 35-man crew of the Mogul is under the command of Captain W. C. Parrish, with John Hoynosh as Chief Engineer. George Rutledge is Superintendent of the project for the Great Lakes Dredge & Dock Co., assisted by John Schreiner.

For the Lakefront Dock & Railroad Terminal Co. of Toledo, William N. Young is Chief Engineer, and B. G. Etchison is Construction Engineer.

When the new docks are in operation, the New York Central and Baltimore & Ohio Railroads will abandon the site of their existing docks along the east bank of the Maumee River from Oakdale Avenue to the Cherry Street Bridge. The Toledo Port Commission has proposed that the City develop the river front in this location, and construct a City-operated rail-air-shop merchandise terminal on the abandoned site.

### R.P.B. Introduces New Paving Breaker

A new paving breaker, designed to do the work of five ordinary 85-pound hand-held machines with only one 105-cfm compressor, is being put into production by the R.P.B. Corp., 2751 E. 11th St., Los Angeles, Calif. Known as the Mighty Midget, the new machine rounds out the line of paving-breaker equipment produced by R.P.B. Corp. It will break concrete and other high types of pavement up to 10 inches thick, and will tamp backfill. With 5,000 foot-pounds of energy available in its striking head, the machine in initial tests broke 900 square feet of 4-inch concrete pavement per hour, it is reported.

One of the most unusual features of the improved Midget model is its ability to operate at its rated capacity of 55 to 60 blows per minute on a 105-cfm air compressor. The new rig thus saves considerable investment outlay for the work it performs, according to its manufacturer.

It is mounted on a tricycle running gear, and is driven by an air motor which can move the machine up a 15-degree incline. The motor is geared to the unit's wheels. One operator can run the machine, and an operator's seat eliminates fatigue by allowing him to devote his energies to the controls.

The new machine measures 6½ feet long x 4½ feet wide x 5 feet high, and weighs 1,450 pounds. It is sturdily built throughout, the company explains, and has a 3-inch piston rod, 5-inch cylinder bore, a 125-pound hammer head, and a strong all-welded frame. Up and down adjustment of the power cylinder will provide the full effective energy of its normal 24-inch length of stroke at all times, regardless of the roughness of pavement being demolished. Seven types of standard Junior paving-breaker tools will also fit the Mighty Midget, and special tools for special applications will be furnished upon request by the manufacturer.

It is expected that the new machine will lower concrete-demolition costs of small jobs, where pavement breaking on any type of accessible surface up to 10 inches thick is required. As the new machine is said to have performed five



The new Mighty Midget paving breaker delivers 55 to 60 blows a minute operating from a 105-cfm air compressor. In initial tests it broke 900 square feet of 4-inch concrete pavement per hour.

times faster than hand-held paving breakers on 4-inch concrete laid on top of a brick pavement, its manufacturer believes its performance comparison will rise still higher on thicker pave-

ment.

Requests for further details and literature should be addressed to the company. Or use the enclosed Request Card. Circle No. 59.

### Data on Testing Machines

A complete line of testing instruments is described in a catalog available from the Riehle Testing Machines Division of American Machine & Metals, Inc., 501 Riehle St., E. Moline, Ill. The company makes machines for testing compression or tension, for determining ductility, reduction in area, deflections, etc.

Catalog No. R-99 presents a short history of the development of testing equipment, followed by a description of the various testing machines and precision instruments which the Riehle Testing Machines Division makes. Photographs illustrate the items, and captions tell their purpose, range, and the models in which they can be furnished. Riehle has also prepared individual data sheets giving fuller information on these machines, such as the cement-briquette testing machine and the universal hydraulic testing machine.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 81.

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If you are holding a CLINTON franchise, contact your distributor for details about NATIONAL CLINTON MONTH and the prize award that is available for this event. If you do not have a CLINTON franchise but are interested in our money-making opportunity—an opportunity for you to sell not alone CLINTON engines but many types of equipment powered by CLINTON—write today—we'll have the distributor in your territory give you full details. There is still time for new dealers to reap the advantage of the special promotions put forth for NATIONAL CLINTON MONTH. It's a good time to get on the Band Wagon!

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## Citizens Write Own Road-Program Ticket

Hold Community, County, and Then District Meetings to List Projects in Order of Preference; Final State-Wide Program Published

By H. E. BAILEY, Director, Oklahoma State Highway Department

THE citizens of Oklahoma, by county and by district, have been deciding their own long-range highway requirements. As a result, the State Legislature now has available a definite and accurate picture of state needs. It now has a sound basis on which to enact legislation that will provide greater revenues and that will hasten the road program to completion.

### Program Announced

Perhaps the best place to begin the story is with a pie supper held at the Rock Chimney schoolhouse in the Big Pasture country. The supper auctioneer has risen to make announcements.

The State Highway Commission is inaugurating a brand-new movement, he tells his audience. It is anxious to learn the road needs of the state in order to perfect a long-range program of improvements. And it feels that the citizens of every community are the ones to decide their own road needs.

First, he goes on to say, each community will have an opportunity to express itself at county-wide meetings. Then spokesmen will convene in a district meeting called by the state highway commissioner representing each Congressional district. At that meeting the desires of each county will be incorporated in a district program, and projects will be listed in order of their preference as agreed upon at the county meetings.

It was with this kind of announcement that the Commission got the ball rolling. But Oklahoma's citizens didn't have to go to a pie supper to hear the announcement. They heard it at union farmer meetings, at the Grange, at farm-bureau meetings, at soil-conservation meetings, at Future Farmers meetings, at road associations, chambers of commerce, civic clubs, and school associations.

### Citizen's Meetings

As a result, community meetings spread like wildfire until they reached every nook and cranny in the cotton country, the wheat belt, the short-grass country, the forks of the creeks, the plains and the hills.

They brought out from 400 to 700 farmers, ranchers, cattle growers, business men, professional men, and public officials to district meetings. Conspicuous were bronzed citizens in beaded buckskin vests and homespun silver ornaments. There were patched overalls in the gatherings, flaming checkered lumberjack shirts, muddy brogans, 10-gallon hats, and cow-country boots. But there were no petty jealousies, community spats, or rivals pulling against each other for an advantage. Projects were adopted in a spirit of the greatest good to the greatest number.

The plan was carried through as the commissioners had originally formulated it soon after they were appointed to office by Oklahoma's recently inaugurated Governor, Roy J. Turner—rancher, cattle breeder, and oil man, who was once a cow poke.

### State-Wide Program Published

After the district programs were filed, State Highway Director H. E. Bailey whipped them into a state-wide program that has just been published as a 300-page document. It is entitled "Statement of Highway Needs for a

### Proposed Long-Range Road Program"

The statement is broken down into eight parts to correspond to each of the eight commissioner districts. Next the district totals are broken down into totals for each county within the district. The county totals are reduced to a complete description of each item in the preference in which each was submitted, together with the estimated cost.

### Estimated Costs

The estimated cost of request projects totaled \$229,083,892—with \$12,591,767 the lowest submitted by any district and \$42,214,750 the highest.

The estimated cost of additional items that were included to complete a highway system was \$104,312,900. By districts the additional items ranged from \$1,569,500 as the lowest to \$34,197,500 as the highest.

Combining the requested items with the additions strikes a total estimated cost of \$33,396,792. Largest of any one district runs up to \$76,412,250 and the

lowest, \$28,077,520.

Present revenues are inadequate to finance the program. In fact, at the current rate of income it would require 10 to 15 years to finish the job. But now that the Legislature has a definite and accurate picture of the situation, it is expected to enact legislation at its next session that will provide greater revenues and allow the program to be hastened to completion.

### Support from the Press

Not one uncomplimentary remark has appeared in the Oklahoma press on the efforts of the Commission to establish a systematic long-range road program. Apparently the press agrees with the commissioners that this is the first time in the history of the state that the lawmakers have been provided with sufficient data to set up an adequate program for financing future road work.

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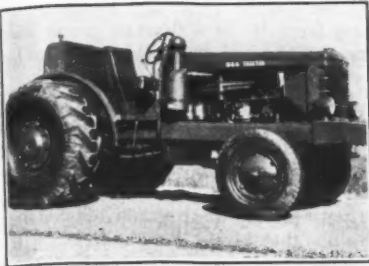


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The new M-R-S Model No. 125 tractor is powered by an International Harvester diesel engine, weighs 13,700 pounds and develops 109 hp at the drawbar. Six optional speed and power ranges are available.

### New Wheel Tractor Is Diesel-Powered

A heavy-duty high-speed 125-hp wheel tractor is announced by the M-R-S Mfg. Co., Flora, Miss. The Model No. 125 tractor weighs 13,700 pounds. It is powered by an International Harvester 4-cycle 6-cylinder valve-in-head diesel engine, and is said to develop 109 hp at the drawbar.

The tractor is furnished as standard power for several models of Mississippi Wagons, and is also available separately as an all-purpose prime mover. It has low-pressure drive tires, and approximately 70 per cent of its weight is on the drive axle. Six optional speed and power ranges are available. Maximum speed in the first range is 37 mph; while the sixth range offers a tractive power of 19,552 pounds at a speed of 2.08 mph. The tractor has an automobile-type seat equipped with cushions, springs, and shock absorbers.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 100.

### '48 Cab-Over-Engine Trucks Shown by GMC

Two new series of cab-over-engine trucks with a total of 11 basic models have been added to its current line of medium-duty trucks by the GMC Truck & Coach Division, General Motors Corp., Pontiac, Mich. The FF-350 series is composed of five models with wheelbases ranging from 122 to 197 inches; and with a gross-vehicle-weight rating of 16,000 pounds and a gross-combination-weight rating of 26,000 pounds. The FF-450 series is offered in the same number of models and wheelbases, but it has a gvwr of 19,500 pounds with the standard rear axle, and 21,500 pounds with the optional heavy-duty rear axle. Gross combination weights are 34,000 and 37,000 pounds, respectively.

A truck type entirely new to GMC cab-over-engine production is the Model FFR-351, a special tractor model in the FF-350 series. It is designed to meet the demand for a truck of this type with a short wheelbase, and in the 2-ton range. It has a 110-inch wheelbase and an overall length of 186 inches.

Among the features claimed for the new line of trucks are a built-in fresh-air ventilation system; increased driver visibility; full adjustable seat; 3-point rubber stabilized cab mounting; easy-operating clutch and brake pedals; improved ball-bearing steering; etc. All models except the FFR-351 are available with the optional de luxe cab which has rear quarter windows, arm rests, right-side sun visor, stainless-steel windshield trim, and stainless-steel exterior and interior window reveals.

Frames of the new cab-over-engine trucks have a nominal depth of 9 inches. This is said to provide a section modulus that eliminates the need for reinforcements or fishplates. The FF-350 models are powered by the GMC No. 248 engine which has a piston displacement of 248 cubic inches. The FF-450 series is equipped with the GMC No. 270 engine, with the No. 248 available as

optional equipment.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 34.

### Power-Driven Spray Units

Descriptive literature on its spraying units has been issued by the Tarrant Mfg. Co., Jumel Court, Saratoga Springs, N. Y. These units are used for spraying asphalt emulsions, curing compounds, weed killers, cut-backs, and similar materials. The folder features a photograph of the Type H sprayer in which the major parts are identified and described.

Text matter explains the features of operation and the uses for which the Tarrant sprayer can be adapted. It tells how the equipment is set up for use, the purpose of the component parts, and includes other information for users of this type of equipment.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 97.

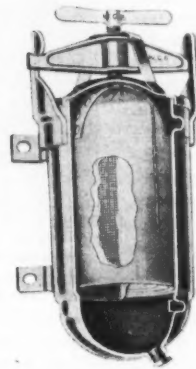
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Descriptive literature sent on request

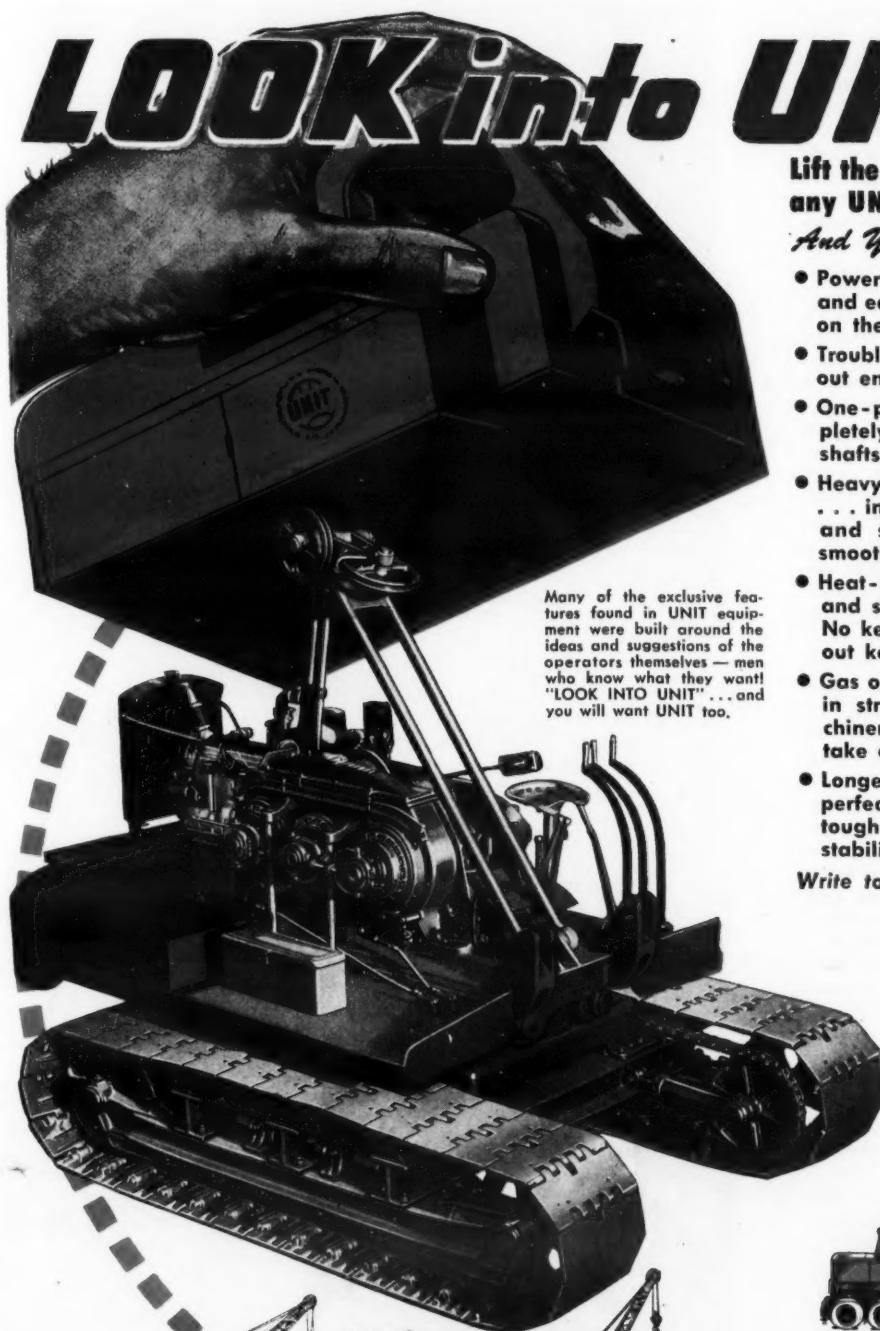


The results which have induced manufacturers to equip their fine motors with WGB Oil Clarifiers were obtained by use of the complete unit. It is not WGB filtration unless genuine WGB cartridges are used. Substitutes cost more because they do less. Be fair to yourself, to your motor and to the WGB Clarifier. Use genuine WGB cartridges and you'll get the economy, efficiency and motor protection which the manufacturer intended you to have.

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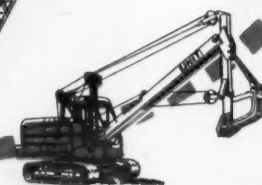
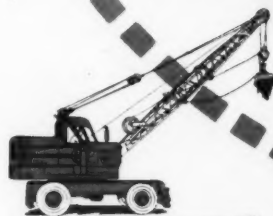
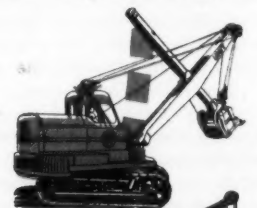
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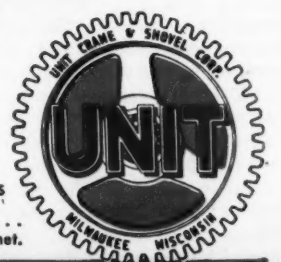
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UNIT CRANE AND SHOVEL CORP., 6309 W. Barnham St., Milwaukee 14, Wis., U.S.A.



## Grade Is Reduced On Mountain Pass

(Continued from page 1)

the eastern slope of Mendon Mountain just west of Sherburne.

Digging into a mountainside deep with boulders was part of the road builders' task in order to better the old alignment. The sharp curves and short sight distances have now been eliminated, and the steep 14 per cent grade has been cut nearly in half, to a maximum of 7.2 per cent. Also of great importance as a safety measure and convenience to the traveling public is the addition of an extra lane up the mountainside for slow-moving truck traffic. This construction is the first of its kind in Vermont, and gives the new road a 30-foot paved surface to accommodate three lanes of traffic instead of the usual two.

The Vermont Department of Highways awarded the contract to the Lambert Construction Co. in the autumn of 1946 on its low bid of \$275,620. Work got under way on October 31 of that year with clearing and grubbing over the new right-of-way. Trees were cut down with hand or power saws, while tractor-dozers pushed or pulled out the stumps. With the labor shortage in this area, the small clearing crew worked right through the winter, keeping ahead of the grading operations which were also in progress.

When spring came and the frost began to thaw out of the ground, work had to be suspended because of the soft conditions underfoot. The rains of April and May then prevented the resumption of activity. Construction started up again in June, but as that month as well as July was likewise very wet, little real progress was made. Good weather in the late summer and autumn of 1947 permitted the completion of the grading, and the laying of the gravel base course. But by that time it was into November, too late in the year to do anything on the tar-gravel surfacing. The paving will probably be done this June or July when the ground dries out enough for the bituminous work.

### Big Cut

The 1.7-mile contract included a grading item of 113,000 cubic yards of common excavation, and 29,000 cubic yards of rock. Earth-work computations indicated that the cuts and fills would balance nicely, with perhaps about 2,000 yards of waste material. Actually the excess amounted to around 5,000 yards which was dumped on the fills. This permitted a flattening of the slopes from the 2 to 1 design on the plans, to 3 to 1, or in some cases, to 4 to 1. The reason for the surplus material was the swell which resulted from blasting the huge boulders that had become part of the mountainside through which the new location was cut. Ages ago the glaciers had deposited them there, cementing them in with sedimentation that nature later blanketed with a thick cover of trees.

Located at the southern end of the Green Mountain National Forest, the project on U. S. 4 begins near its intersection with State Route 100 and continues westward up the mountain in the direction of Mendon. At the intersection, and for about 1,000 feet beyond, the new road is 22 feet wide with 8-foot shoulders. Then it widens to 30 feet for the extra truck lane, as it starts climbing up the new location, while the shoulders are reduced to a width of 4 feet.

Of the total 142,000 yards of excavation, 101,000 yards came out of a single continuous cut in the new location. This cut was 2,000 feet long with an average depth of 20 feet. At one point, the width measured between the tops of the opposing slopes is 235 feet. Well-thought-out design required only one-



C. & E. M. Photo

An International TD-18 tractor-dozing with a 10-foot Isaacson blade works in new location on U. S. 4 in Vermont.

third of this material to be hauled uphill, with two-thirds going into fills downhill from the cut. The haul distances from the big cut were short, the maximum being 2,000 feet.

### Winter Work

Good progress was made during the first winter of construction while the contractor was working in the big cut. Surrounding the boulders in this area was a wet, silty sand, in which the contractor kept the working face area for his shovel as small as possible. In this way he prevented a large expanse from freezing over every night and making the initial digging so much the more difficult at the start of the day's work. The wet fills froze solidly as quickly as placed, and thus supported the earth-moving equipment instead of bogging it down.

Through the winter a No. 80 Lorain 1¾-yard shovel worked the cut. It loaded out to two Athey PD-10 side-dump rubber-tired wagons, with an 8-cubic-yard capacity and pulled by Caterpillar DW-10 rubber-tired tractors. The wagons moved the dirt as well as the rock. Actually, of the 29,000 yards of rock listed as a contract item, only 150 yards was ledge; the remaining yardage consisted of boulders. But the

boulders were big, many of them running from 80 to 100 cubic yards each, and they had to be well broken up before they could be moved.

A Worthington jackhammer, powered by a Worthington 210-cfm air compressor, drilled holes into the boulders—as many as 12 to 15 in the large ones. They were charged with du Pont 40 and 60 per cent dynamite, and blasted into chunks that could be handled by the shovel and wagons. The boulders were generally buried deep in the fills, either at the bottom or a couple of feet from it, with the dirt dumped over them to fill in the voids. Because of the size of the boulders, the lifts of fill were 4 to 5 feet thick. Spreading was done by a Caterpillar D7 tractor-dozing and two Internationals—a TD-9 and a TD-18, the latter equipped with a 10-foot Isaacson blade.

### Drainage

Many yards of stone boulders were employed to line a creek channel on the (Continued on next page)



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side bordering the new highway. By relocating the creek along the new section, the construction of two bridges was eliminated. The new channel section, dug with the shovel, is 1,500 feet long and 10 feet wide at the bottom, which is 5 feet 3 inches below the level of the adjoining shoulder. The back-slope away from the road is 2 to 1. The stone retaining wall against the shoulder is 3 feet thick, and is supported on a boulder footing. The footing goes down to a depth of 2 feet below the bottom of the channel, and is over 5 feet wide, extending back under the boulder wall.

At one point under the high 40-foot fill, an 11-foot 3-inch-diameter galvanized-metal-plate circular pipe culvert was laid to a length of 159 feet. Originally this location called for a reinforced-concrete culvert, but because of the shortage of reinforcing steel the metal pipe was used instead. The plates for the big pipe were supplied by the Berger Metal Culvert Co. of Boston, Mass., and were bolted together on the job. Each plate is 10 feet



C. & E. M. Photo  
An Athey wagon side-dumps a load of gravel sub-base during the Lambert Co. job, while a Caterpillar No. 12 motor grader levels off ahead.

long x 4 feet wide, and curved to a circular arc. Nine plates comprised a ring. The material was shipped by rail to Rutland, Vt., which is on the Rutland Railroad, and hauled 13 miles out to the job site by truck.

Drainage pipe also included reinforced-concrete pipe in 18 to 24-inch sizes, supplied by the Rutland Concrete Pipe Co. of Rutland, Vt.; and asphalt-coated corrugated galvanized-metal pipe. The latter came from the North-

east Metal Pipe Co. of Boston, Mass. The pipe material was delivered to the job by truck.

#### Compacted Fill

Every advantage was taken of the daylight hours during that first winter of construction. The shovel worked a 12-hour day whenever possible, from 6 a. m. to 6 p. m. Floodlights were put in use for the early dawn and the late hours of dusk. In the summer the hours increased, with the small force of 15 to 20 men working from 6 a. m. to 7:30 p. m., and occasionally as late as 10 p. m. under lights. The lone 1 3/4-yard shovel excavated from 1,200 to 1,800 yards a day, and one week hit a high of 10,000 yards.

Natural settlement, and the passage of heavy equipment over the fills, resulted in a well compacted embankment by the summer. Where the new road superseded the old, the steady traffic on U. S. 4 also helped the compaction. Trucks, heavily laden with pulpwood from New England forests, use this highway on their way west to the paper mills in eastern New York State. Great slabs of granite and marble from the Vermont quarries around Barre and Roxbury are also hauled over U. S. 4 to the rail center at Rutland or to points beyond. These slow-moving vehicles will no longer create a bottleneck at this point on the road, since they can now keep in the truck lane and let the faster-moving traffic use the other two lanes.

Up until two years ago, the back-slopes in cuts on Vermont highways were 1 1/2 to 1. They have now been flattened slightly to 2 to 1. Side ditches are 2 feet wide with their bottoms 3 feet 4 1/2 inches below the center-line grade.

#### Gravel Sub-Base

As the grading was completed, the entire roadbed out-to-out of shoulders was covered with a gravel sub-base. It averaged 15 inches thick over the fills, and from 18 to 24 inches in the cuts. The specifications for the gravel required that it be uniformly graded from coarse to fine with a maximum size of 6 inches, and that not more than 40 per cent could be retained on the No. 4 sieve. These conditions were met by taking material from two gravel pits, both within short hauling distance from the project.

One pit yielded gravel that was fairly coarse in gradation, and this was used to supply material to within 2 inches of the final sub-base grade. This pit was located on State Route 100, about 1 1/2 miles from its intersection with U. S. 4 at the eastern end of the job. The upper 2 inches of the sub-base came from a pit where a finer gradation was obtained, located on U. S. 4, about 2 miles from the east end.

The gravel was dug out by a Link-Belt Speeder 3/4-yard shovel. It was hauled both by side-dump Athey wagons and by a fleet of from 6 to 10 trucks carrying from 4 to 5 yards each. The trucks were hired by the hour. As the gravel was dumped, it was spread in 6-inch layers by a Caterpillar No. 12 motor grader and compacted by the hauling equipment and the traffic. It was given a final rolling with a Buffalo-Springfield 7 1/2-ton 3-wheel roller. The larger 1 3/4-yard shovel also worked in the gravel pit at different intervals when it was not employed on the grading.

As the gravel sub-base was laid in the summer and autumn, and as the pavement was not to be mixed in place until the following summer, it was decided to give the sub-base a shot of bitumen to keep the surface intact through the winter. The application consisted of 1/2 gallon of RT-5 to the square yard, put on between 120 and 150 degrees F. The work was done by the Barrett Division which transported the tar from Worcester, Mass., in a

(Continued on next page)

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## Grade Is Reduced On Mountain Pass

(Continued from preceding page)

2,500-gallon trailer tank truck. At the job site the bitumen was transferred into a 1,000-gallon distributor and applied in two 15-foot lanes. The average penetration was  $\frac{1}{2}$  to  $\frac{3}{4}$  inch.

### Steel Guard Rail

About a mile of guard rail was erected along the shoulders of the higher fills. The posts are 6-inch steel I-beams, 5 feet 9 inches long, weighing 56 pounds. They were driven on 16-foot centers with 26 $\frac{3}{4}$  inches projecting above the ground. They are connected by three lengths of steel-wire cable spaced 6 inches apart. The cable is 3-strand and  $\frac{3}{4}$ -inch-diameter. Both posts and cable were supplied by the Bethlehem Steel Co., and shipped to the job from its plant at Sparrows Point, Md.

Driving these steel beams into the densely compacted fill, in which boulders predominated, posed a problem for the contractor. He solved it by a unique application of a wagon drill. A hole was first drilled into the shoulder by an Ingersoll-Rand JA-35 wagon drill running off the Worthington 210-cfm air compressor. A 2 $\frac{3}{4}$ -inch bit was used at the end of a 5-foot length of 1 $\frac{1}{4}$ -inch drill steel. The hole was made as deep as the bottom of the beam had to reach.

Then the drill steel was removed from the wagon drill, and in its place a driving head was installed by which the steel-beam posts were driven to grade. This driving head, made by the contractor, consisted of a 6 x 8-inch steel plate, 2 inches thick, with short pieces of angle iron welded on one side. The upper end of the post framed into this template arrangement which prevented the driving head from slipping off the post as it was driven. At the top of the plate a 5-inch length of drill steel fitted into the chuck of the wagon drill. The bottom end of the steel beams were burned off to a beveled point to facilitate the driving.

Two men with the wagon drill drove the posts neatly and quickly to line and grade. The drill was mounted on a 2-wheel rubber-tired carriage that was easily maneuvered by hand. The welding and burning work on the steel was done with a Star-Dualarc 400-amp electric welder.

### Mixed-in-Place Surface Course

Early this summer when the weather is warm and the road is thoroughly



C. & E. M. Photo

A creek was relocated along the new section of U. S. 4, and here a Lorain 80 1 $\frac{1}{4}$ -yard shovel is shown digging the stream channel. The relocation of this creek eliminated the construction of two bridges.

dried out after the spring rains, a 2 $\frac{1}{2}$ -inch surface course of crushed gravel, mixed in place with tar, will be laid on the gravel sub-base. On the 30-foot sections, the pavement will have a

parabolic crown of 2 $\frac{1}{2}$  inches. Loose material will first be cleaned from the top of the sub-base with a wire broom drag, and, if necessary, more of the RT-5 tar prime will be added.

Crushed gravel for the surface course will be supplied by the Barker Sand & Gravel Co. of Rutland, Vt., and delivered by truck to the job after a 13-mile haul. It will be placed in a windrow along one side of the road, and then spread out to the full pavement width by the motor grader to a loose depth of 3 $\frac{1}{4}$  inches. The gradation of the washed and crushed gravel has the following sieve limitations:

Sieve Size	Per Cent Passing
1 $\frac{1}{4}$ -inch	100
1 $\frac{1}{2}$ -inch	95-100
$\frac{3}{8}$ -inch	5-15
No. 4	0-5

Traffic will then be held up momentarily while the full width of gravel is given a shot of RT-6 tar at the rate of  $\frac{1}{2}$  gallon to the square yard, and applied at temperatures ranging between 200 and 250 degrees F.

The tar and gravel will be thoroughly mixed; then the mix will be spread out again to the full width and more of the same tar added, this time at the rate of

(Concluded on next page)

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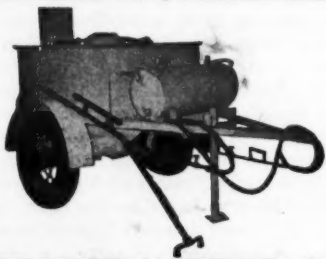
The ridge design of these bits allows faster drilling speed and produces unusually accurate results.



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0.4 gallon to the square yard. After additional mixing as before, the mat will be spread out and rolled by a 3-wheel 7½-ton roller to the required depth. The light roller will be employed so as not to break up the gravel.

#### Seal Coat

Sand will then be applied over the surface with a sand spreader to fill in all the voids. Surplus material will be broomed off and traffic put back on the road. In order not to tie up traffic too long during the mixing operations, stretches of road from 500 to 1,000 feet only will be worked on at a time.

After about a week or more of traffic, the surface will be sealed with a tar and gravel coat. Again working only in short lengths, a shot of RT-7 tar will be applied at the rate of ¼ gallon to the square yard. The bitumen will be immediately covered with peastone and rolled. A surplus of stone will be spread so that traffic, which will at once be permitted over the road, will gradually force the stone down into the mat and fill up all the voids.

The gradation of the sand and peastone is as follows:

Sieve Size	Per Cent Passing
4-inch	100
¾-inch	95-100
¾-inch	100
No. 4	0-5
No. 100	0-3

#### Quantities and Personnel

The major items on the U. S. 4 road-relocation project in Vermont include the following:

Common excavation	113,000 cu. yds.
Rock excavation	29,000 cu. yds.
Gravel sub-base	27,000 cu. yds.
Crushed gravel for surface course	2,200 cu. yds.
Bitumen	57,000 gals.
Guard rail	5,236 lin. ft.

The activities of the Lambert Construction Co. were directed by Jim Lambert, head of the firm, together with his brother, Darrell Lambert, and A. J. Cerutti, Superintendent.

For the Vermont Department of Highways, Rod Maynes is Resident Engineer, assisted by Don Martin. The Department is headed by Hubert E. Sargent, Commissioner. H. W. Marsett is Highway Engineer, and F. C. Coates is Construction Engineer.

#### Alloys for Use in Welding

Alloys for use in resistance-welding accessories and equipment are covered in a catalog made available by the Acme Electric Welder Co., 2618 Fruitland Road, Los Angeles 11, Calif. These alloys are made for use in spot-welder tips, electrodes, flash and projection-welding dies, and seam-welder disks.

Catalog No. 502 describes the complete line of Acme Alloy, Superloy, and Stainloy equipment. New items listed, in addition to the complete line of standard Acme tips and holders, include special gooseneck tips, offset tip holders, and seam-welder disks. Prices and specifications of the complete Acme line are listed in the catalog.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 65.

#### Calif. Plant for Ryerson

Joseph T. Ryerson & Son, Inc., has completed the construction of a steel-service plant at Emeryville, Calif., to serve the San Francisco Bay area. The building measures 720 x 220 feet. A 2-story office building fronting on 65th St. is an integral part of the warehouse structure. Wayne D. Dukette, formerly Manager of the Ryerson plant in Cincinnati, is Manager of the San Francisco plant. Ray C. Page, formerly an Assistant Sales Manager in Chicago, is Sales Manager.

Other Ryerson plants are located at New York, Boston, Philadelphia, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Milwaukee, Chicago, Los Angeles, and St. Louis.

## Airplanes at Work Need Landing Strips

The personal and company-owned airplane is coming to hold a position of importance in the construction industry. It is used to speed the delivery of replacement parts to a job, and so reduce the time lost through equipment breakdown; it is used by contractors to cover projects spread over a wide territory, for rapid inspections of job progress, and many other purposes.

What, then, are its major advantages? Why isn't it in even wider use? Just how useful a piece of equipment is it for a contractor to own? The Aircraft Industries Association of America, Inc., 610 Shoreham Bldg., Washington 5, D. C., has undertaken to find the answers to these and other questions relating to the personal airplane. The group has tried through a questionnaire to determine what American industry and commerce think of the personal plane; to determine who uses and flies it; and to gather data on the overall

picture of its future.

The survey brings out this significant fact: a serious drawback to more widespread use of the personal plane is the lack of sufficient and satisfactory landing facilities. The survey indicates that there will have to be more airport and runway construction before personal business planes are more widely used. It also indicates that a good deal of planning will have to go into the de-

sign of these facilities.

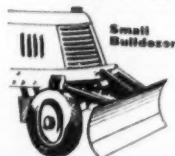
For instance, the survey points out a need for airfields and runways close to municipal areas; for more parallel runways; for increased night-flying facilities; for more hangar space; for better fueling service; and for a national system of tied-in airports and a standardized system of airport markings, similar to that being employed in the new Skyways systems.

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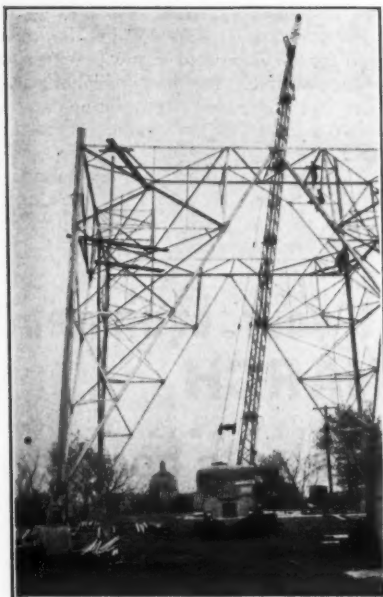
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A Lorain Moto-Crane with a 125-foot boom was used in the erection of this FM tower for Pittsburgh radio station KDKA.

### Magnetic Separator Is Conveyor Feature

A bulk-material conveyor equipped with a magnetic separator is manufactured by Material Movement Industries, Inc., 9257 Laramie Ave., Skokie, Ill. The Tote-All conveyor is now available with an adjustable chute said to remove stray iron from the material being conveyed. The chute may be attached or detached as desired, and is equipped with a built-in permanent magnet. The magnet is made of high-grade Alnico, and is non-electric. Maximum recommended speed for efficient operation of the magnet is about 100 feet per minute.

The Tote-All Zephyr is available in any length from 6 to 24 feet in multiples of 2 feet and in belt widths of from 8 to 10 inches. It is powered by a 1½-hp gasoline engine or a ½-hp single-phase electric motor.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 4.

### West-Coast Engineer Dies

Frank B. Lessman, Highway Engineer in the Western Headquarters Office of the Public Roads Administration in San Francisco, died recently in Ogden, Utah. Death occurred as he was

returning from a two-week conference of highway-planning engineers in Washington, D. C.

### Hydraulic Scraper Has Forced Ejection

A new series of 2-wheel hydraulic scrapers has been announced by the Be-Ge Mfg. Co. of Gilroy, Calif. The units are made in two models: the SS-750 for use with the Case Model LAI rubber-tired tractor; and the Model SS-630 for use with the Case Model DI tractor or with the LAI. The SS-630 has a struck capacity of 2.6 cubic yards, and a heaped capacity of 3.2 yards; the SS-750 has a struck capacity of 4.2 yards, and a heaped capacity of 5.4 yards.

All operations are hydraulically controlled. A uniform depth of cut is said to be maintained by a positive down pressure exerted on the blade. Among the other features claimed for these



Two new Be-Ge hydraulic scrapers for use with Case tractors are available. Struck capacities are 4.2 and 2.6 cubic yards respectively.

Speedhauls are forced roll-out ejection; a powered apron which rises independently of the bowl; and a low overall height designed to permit loading by shovel or dragline bucket. Wheels and tires are changed without dis-

mounting the axle. A 3-piece reversible blade is standard, with a straight blade optional.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 30.

SEALTEX being applied to new Arroyo Seco Parkway overcrossing on approach to Hollywood Freeway.

CALIFORNIA DIVISION OF HIGHWAYS



**SEALTEX** concrete curing compounds meet the exacting specifications of the Bureau of Reclamation, Army and Navy, other Federal agencies; State Highway Departments, Counties, Cities, Engineers and Architects.

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# Maintenance Methods For Bituminous Roads

## Practices for Medium And Low-Type Surfaces Are Outlined; Personnel Training Is Important

By J. S. BRIGHT, Deputy Commissioner for Construction and Maintenance, Public Roads Administration

♦ THERE is now in the United States a 3,313,000-mile highway plant representing a public investment of over \$30,000,000,000. This system was maintained during 1947 at an expenditure of \$967,000,000 for 365,000,000 vehicle-miles of travel, including the haul of approximately 95,000,000,000 ton-miles of personal property on rural roads only. These figures illustrate the fact that maintenance, regardless of types of highway surfaces, is no longer a mere patching job. It is often not realized that the "take" for maintenance out of highway revenue on a national basis is now almost one out of every two dollars.

This billion-dollar enterprise requires (1) continuous personnel training programs; (2) coordination with design departments so that weaknesses which have shown up during maintenance work can be avoided on new projects, and so that worn-out sections can be eliminated from maintenance and replaced. It involves (3) a knowledge of the best road-repair methods; (4) of equipment; (5) and of unit costs for budget purposes and to detect inefficiencies and promote efficiencies in operation.

### Personnel Training Programs

The proportion of road revenues being spent each year to maintain and operate highways stresses the importance of staffing and training maintenance organizations properly. The country should see in the large maintenance expenditure the need of compensating adequately our present organization and the young engineers who must be prepared to carry on the work.

The term "engineer" means "the ingenious one". And there is no place where ingenuity can be exercised more continuously and at more levels than in the maintenance field. It should, therefore, appeal to the best of our young, energetic engineers.

The maintenance field man comes in contact with more road users than do the members of any other division of the highway field. To the average citizen he represents our highway organizations. He can be our greatest source of good will through courtesy and work well done.

Actual field maintenance operations will not be improved nor will maintenance costs be lowered unless knowledge gained from field work and other sources is brought to the attention of supervisors, gang foremen, patrolmen, and equipment operators. Time and costs are actually saved through the tricks of the trade which the operator of a bituminous distributor, for ex-

ample, picks up and passes on to other operators. It is therefore important to review the nature of the training program that is being carried on by some of the state highway departments.

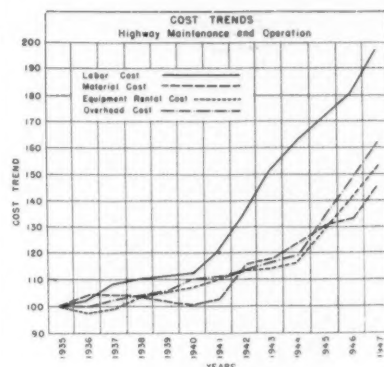
For example, the State Maintenance Engineer of South Dakota has initiated a training program for maintenance personnel. He arranges one-day conferences at some ten strategic towns in the state. These conferences are attended by him, the District Engineer, the District Maintenance Superintendent, the local shop foremen, general foremen, county foremen, area crew foremen, and by the equipment operators within the surrounding area. In general the equipment operators invited are those who operate power machines such as blades, tractors, shovels,

mowers, and various types of bituminous equipment.

The program at these conferences consists of lectures on the use, maintenance, and care of equipment, on safety measures, on signs, and on general maintenance problems. Usually the lectures, or talks, are given by the Maintenance Engineer, District Engineer, and Maintenance Superintendent, as well as by other available talent. After these lectures there is a round-table discussion and question period. Attendance at the conferences ranges up to 70 persons per session. Since the conferences are restricted to one day at each town, and since attendance is from an area adjacent to that town, loss of output on maintenance work by personnel is kept at a minimum.

### Correlation With Design, Construction

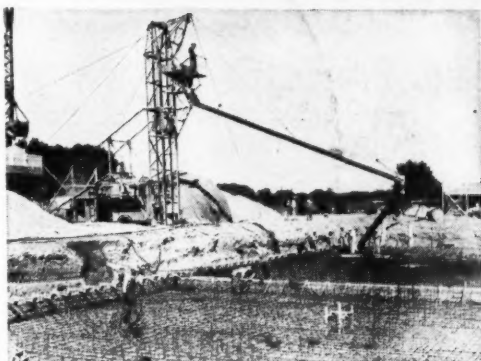
Correlating maintenance with design and construction is another relief of maintenance problems which is becoming a recognized practice. The maintenance department lives today with the



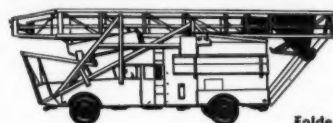
accumulated results of the design and construction department efforts from the 1920's and 1930's. The proper reporting of road weakness by maintenance forces while the road is in service avoids similar problems on new construction. The reporting of worn-down bituminous sections which are being "nursed" along and which are

(Continued on next page)

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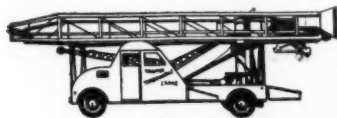


### MIXERMOBILE



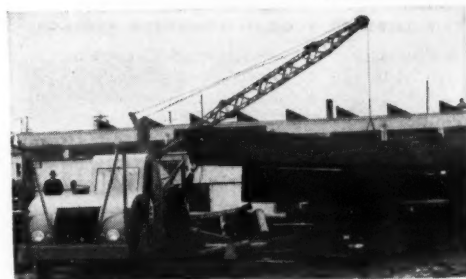
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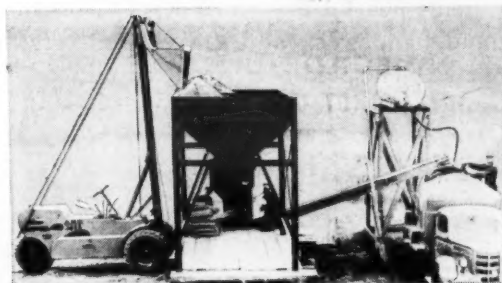
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Public Roads Administration Graph

The average maintenance dollar spent on low and intermediate-type bituminous surfaces is accounted for cent by cent in this graph.

## Maintenance Methods For Bituminous Roads

(Continued from preceding page)

expensive to maintain permits the design department to program the projects out of maintenance for replacement by reconstruction.

In a recent survey, the most frequent reason assigned for needed reconstruction of bituminous surfaces was an inadequate or unstable base, causing spring surface failures and uneven settlements. Drainage problems resulting from low-grade lines and shallow ditches were also described as reasons for surface failures, as well as increased volume and weight of traffic, narrow surfaces and shoulders, and actual wearing out of pavements.

### Maintenance Methods

The Committee on Maintenance and Equipment of the American Association of State Highway Officials has adopted four sections of a maintenance manual which is now in preparation for the printer. This manual has been adopted by the votes of the 48 states, the District of Columbia, two territories, and the Public Roads Administration. Of this group 48 voted affirmatively, which is a high average for such projects.

The discussion to follow is based on the findings of the states in this manual in connection with the maintenance of low and medium-type bituminous road surfaces.

Low-type bituminous surfaces are those produced by surface treatment and drag treatment where the base course consists of materials such as stabilized soils, sand-clay mortar, coarse-grade aggregate, soil-cement, or similar surfaces.

The intermediate bituminous surfaces consist of road-mix, traveling road-plant mixes, or similar types where the surface materials have inherent stability. The depth of the surface course is usually greater than in the low-type classes and may consist of one or more bituminous courses. The base course may be of the same materials as described for the low-type bituminous surfaces.

Proper maintenance of bituminous surfaces is timely action along five lines: (1) patching, (2) paint-patching, (3) scarifying, (4) resealing, (5) non-skid treatment.

### Patching

Before operations begin, several steps should be taken in the interest of preventive maintenance. These include determining the cause of the failure, such as poor drainage or insufficient base; making the necessary subgrade correction; selecting the proper bituminous types; or making temporary emergency repairs. The latter, temporary patching, may be desirable during poor weather conditions, before the subgrade material has consolidated, or for similar reasons.

When it does become necessary to patch with bituminous materials in wet weather to prevent raveling and ex-

tensive deterioration, the use of additives, either in the bitumen or as a coating on the aggregate may be desirable. The discussion of this subject by the Committee on Maintenance and Equipment, AASHO, at the September 1947 meeting in New York, developed considerable interest and differences of opinion on the use of additives. The fact that their use is extensive and widespread was also brought out.

An indiscriminate use of additives without support of laboratory tests is not justified. There is no question of the stability of scientifically proportioned mixtures of nonhydrophilic aggregate or fillers with proper grades of bituminous materials; such mixtures can be used under wet conditions with

the loss of stability ranging from only 10 to 20 per cent. But additives are useful where hydrophilic aggregate and filler are the only materials available.

Low-type surface patching should consist mainly of applying thin bituminous coats to areas where raveling or cracking have developed, and covering with suitable aggregate to strengthen the surface or with a thin application of pre-mixed material where it will accomplish the same results.

On intermediate-type surfaces where shallow disintegration has occurred, the method for low-type surface patching will also be satisfactory. Where the disintegration has reached a depth of 2 inches or more, the application of pre-mixed bituminous material or the pene-

tration method of patching with coarse aggregate and hot bitumen are the approved methods.

### Paint-Patching

Paint-patching or seal-patching are forms of preventive maintenance which generally involve small areas. They consist of applying thin surface treatments with bitumen and covering with fine stone chips, pea stone, or coarse sand—followed by rolling with a light roller.

### Scarifying

Low-type surfaces which require repairs over extensive areas should usually be scarified and reworked. The

(Continued on next page)

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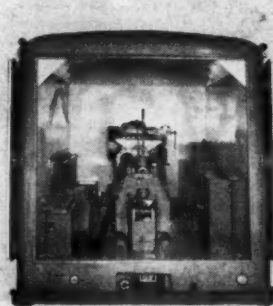


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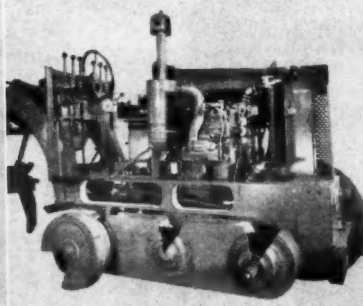
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Interior view of one of the Educational Trucks.



Cut-away of controls, engine and driving wheels of Model A-D Motor Grader.



Classroom views of mechanic's school.



sub-base may require a prime coat and the reworked bituminous surface a seal. The manual should be consulted as to details on the amounts and classes of additional material to be applied. Another method is to add more bituminous binder to the windrowed material before final laying. This will permit omission of a seal. On soil-cement bases it generally is undesirable to use the rework method.

Corrugated road surfaces can be corrected by the modified surface treatment or "honing operation" if corrugations are less than 1½ inches in depth. This method involves four steps—cleaning surfaces; applying a penetrating bitumen; spreading necessary chips or coarse sand; and dragging

or blading the surface until it is smooth or the materials set. A light seal may ultimately be desirable.

#### Resealing

In time, both the low and intermediate bituminous surface types may need a seal coat to exclude moisture or live against oxidation. This may be accomplished by any one of three types of surface treatments.

1. Light surface treatment consists of a single application of a bitumen with or without a mineral aggregate cover as desired. The work is sometimes called seal-coat application.

2. Heavy surface treatments consist of single, double, or triple application of bitumen with mineral cover of coarse

graded aggregate. This work is sometimes called a penetration type of surface treatment, armor coat, or oil-mat treatment.

3. Drag surface treatment consists of applying a prime or tack coat to a prepared surface, spreading the mineral aggregate and applying the bituminous binder, and manipulating the course for a more intimate mixture of aggregate and bitumen. This work is sometimes called a retread treatment. It does not include road-mix or plant-mix surfacing where the finished course is 2 inches or more in thickness.

The procedure in carrying out any one of these three surface treatments is similar for both low and intermediate-type surfaces. The following sequence

of work is recommended: patch, seal, and build up weak or depressed areas; make provisions to protect structures, guard rails, etc., against splashing during spraying operations; clean surface thoroughly; apply the bitumen and spread mineral aggregate. This procedure is applicable to all three classes of surface treatment. Subsequent operations vary somewhat as follows, depending on the type of treatment.

The single surface treatment may require light dragging with a broom drag and rolling with a lightweight roller to imbed the aggregate. The roller may be omitted with sand cover.

The heavy or armor-coat treatment may require a prime coat before the

(Concluded on next page)



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Public Roads Administration Graph  
Of every dollar for the maintenance of low and intermediate-type bituminous roads, 58 cents goes for surface maintenance; 42 cents for other off-surface operations.

## Maintenance Methods For Bituminous Roads

(Continued from preceding page)

seal is applied. After the prime has had time to penetrate, the heavy bituminous material is applied immediately, followed by the spreading of aggregate. The armor coat differs from a heavy or double treatment in that the aggregate is spread before the bitumen is applied. The surface is rolled after key stone is spread, and then followed by the final seal treatment.

A drag treatment or retread differs from armor coat in that blading and mixing of the materials is carried out to produce a smooth surface and more intimate mixture. The surface is finished with a light bituminous treatment covered with fine aggregate and lightly rolled.

### Non-Skid Treatment

Slippery bituminous pavement usually results from an excess of bitumen on the surface. Prompt remedial action should be taken to correct the condition. One method is a modified surface-treatment process which may be used successfully. An application of light oil with a suitable angular aggregate may prevent skidding tendencies. In severe cases a drag treatment or a complete rework of the surface may be required.

It should be borne in mind that these methods and practices represent the best judgement of the majority of state maintenance engineers. No hard and fast rule can be laid down which would

apply to all types of surfaces and to the many climates encountered in the United States. Some maintenance engineers prefer the slow-curing grades of asphaltic materials, where reworking is practiced over the maintenance of many years. A point often neglected is the oxidation or hardening of bituminous patching material due to continuous heating for long periods in small portable kettles or distributors. The characteristics of different slow-curing materials are not altogether universal, depending upon the field from which they are produced, and this uncertainty of characteristics may account for the preference some engineers have for the medium-curing and slow-curing types. Where they are available, coal-tar distillates are frequently preferred by engineers for maintenance work.

### Maintenance Costs

One state maintenance engineer said that it has become progressively difficult in the past 10 years to get off the surface and perform other needed

maintenance. With that statement in mind, some charts have been prepared which show a breakdown of the national average maintenance dollar for low and intermediate-type bituminous surfaces.

One of these discloses that 46 cents of the maintenance dollar goes for labor, 24 cents for materials, 22 cents for equipment, and 8 cents for overhead. A further breakdown of these costs is as follows:

Item	Cents
Labor	
Common	23
Equipment operators	10
Patrolmen	4
Foremen	3
Skilled	1
Material	
Liquid bituminous	8
Bituminous mix	2
Gravel	3
Stone	5
All other materials	5
Equipment	
Trucks including distributors	11
Cars and pick-ups	2
Graders	2
Other equipment	7
Overhead	
Salaries	7
Other items	1
Total	100

Another chart discloses that 58 cents of this maintenance dollar goes for the repair of surfaces of low and intermediate-type bituminous roads and 42 cents goes for the other highway maintenance operations. A further breakdown of these costs is as follows:

Item	Cents
Surface	
Labor	23
Materials	19
Equipment	12
Overhead	4
Other operations (off surface)	
Labor	23
Materials	5
Equipment	10
Overhead	4
Total	100

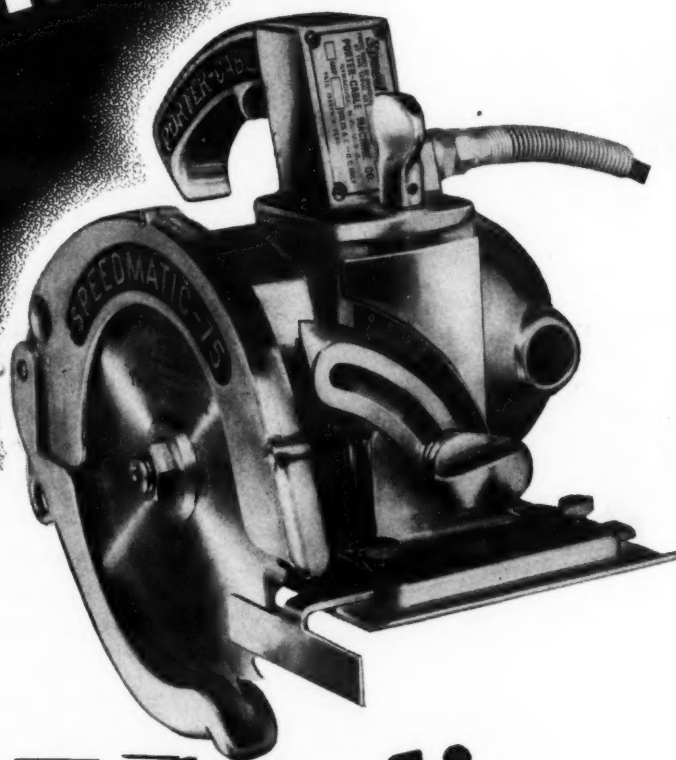
From a paper presented at the Ninth Annual Highway Engineering Conference, University of Utah, March, 1948.

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The truck cranes have independent power units for travel and for crane service. This is to permit fast travel at highway speeds, and full power for crane work. Other features of the P&H truck crane include: hydraulic control, independent planetary boom hoist, planetary load lowering, all-welded construction, and others.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 15.

### Diesel Fuel Injector, Single-Plunger Type

A single plunger type of fuel injection pump for use with diesel engines has been announced by the American Bosch Corp., 3664 Main St., Springfield 7, Mass. The Model PSA-A is comparable to the Type APE multi-plunger helix-controlled pump of the A size. It is designed for normally aspirated 4-stroke engines with a piston displacement of up to 80 cubic inches per cylinder, or for fuel quantities of up to 90 cubic millimeters per stroke.

The single plunger and single delivery valve are said to do the work formerly allocated to several plungers and delivery valves. The pump is driven at crankshaft speed, and is of the cam-actuated constant-stroke throttled-intake type. The plunger has a continuous rotary motion in addition to its reciprocating motion; thus it serves as its own fuel distributor.

The Model PSA pump is equipped with a fuel-supply pump of the positive-displacement gear type located at the side of the pump housing, and a variable-speed governor of the mechanical centrifugal type incorporated at the rear. It is driven directly off the end of the camshaft without gearing. Present production includes the 4-cylinder-type Model PSA-4A and the 6-cylinder-type Model PSA-6A.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 8.

### Decals for Contractors

Twenty-three industrial uses for decalcomanias are listed in a catalog being distributed by The Palm Bros. Decalcomania Co., 3732 Regent Ave., Cincinnati 12, Ohio. The 10-page booklet explains the nature and advantages of this type of product. It sets out to show what decalcomania can do for the user, and lists seven special features.

The Palm line covers a variety of decal applications varying in size from small name plates to large truck markings. It includes slideoff decals, window signs, double-face signs, Palmlacs for use on heavy machinery or equipment subject to exposure to the elements, varnish-applied decals, transparencies, glare-proof, write-in, serial-numbering, and other types of decals. Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 58.

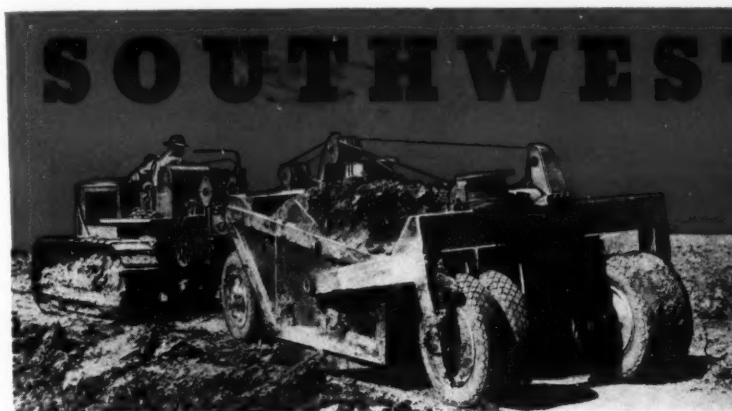
### Hawthorne Re-Joins Euclid

T. J. Hawthorne has been named a District Manager for The Euclid Road Machinery Co. of Cleveland, Ohio. He has been assigned the states of Colorado, New Mexico, and Arizona, and sections of Texas and Wyoming. He returns to Euclid after an absence of about ten years during which he represented the Lima Shovel Co. in several western states. Mr. Hawthorne will make his headquarters in Denver.



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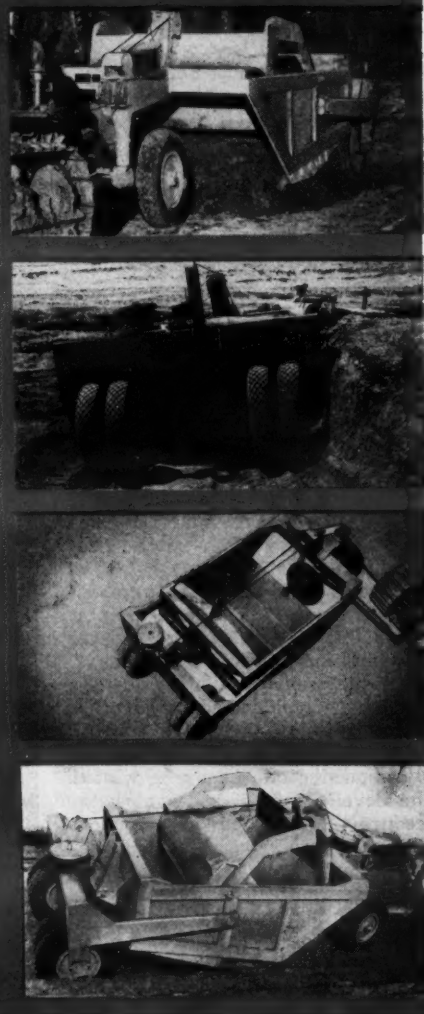


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# Road Builders Discuss Methods, Equipment

## Western States Confer On Current Practice and Machines for Bituminous, Concrete, Soils Work

CONSTRUCTION equipment and methods on highway work look different when viewed through the eyes of the highway engineer, the contractor, or the equipment manufacturer. But none of the problems are unsolvable, and closer cooperation between these three groups will eliminate the disparity in viewpoints. That was the conclusion of 240 registered delegates who attended the Western States Conference at the Hotel Whitcomb in San Francisco, April 8-9.

The conference was sponsored by the Committee on Development of Highway Construction Equipment—a cooperative endeavor of the Highway Research Board and the American Road Builders' Association. It was under the general chairmanship of Harold F. Clemmer, Engineer of Materials of the District of Columbia Department of Highways. Marked by the absence of prepared papers, the meetings were designed to bring out current problems, their solutions, and advances in equipment and construction practice as related to soils, concrete, and bituminous construction throughout the United States. And interesting expressions of opinion were drawn from assembled delegates by the various chairmen selected to preside over the two-day conference.

### Compaction of Soils

Soil-compaction practice was discussed in a morning session, with Earl F. Bennett, Principal Soils Engineer of the New York Department of Public Works, and Lyman D. Wilbur, Chief Engineer of the Morrison-Knudsen Co., Inc., as Co-Chairmen. Subjects included advances in compaction theory, the interpretation of contract specifications, and compaction procedures.

It was pointed out that a basic relationship exists between moisture and density; that the modified Proctor method can increase density and decrease moisture; that a set of reasonable values exist for different locations and soil types, and that unless the specifications are prepared more precisely for given soil conditions, the best compactive result may often not be economically attained.

Soils were grouped loosely into four principal classes: (1) free-draining sands and gravels; (2) fine sands or silts, which can be classed as "quaky"; (3) plastic soils which lose their strength when molded and are governed predominantly by their clay content; and (4) expansive soils on which the best compactive effort may be wasted.

The development of soil-compaction procedure has been synonymous through the years with the development of earth-moving and processing equipment. Contractors present at the meeting admitted that they realized the vital necessity of getting the best practicable compaction results. But they pointed out that young engineers must learn to look at the economics of engineering as well as a higher standard of results, to determine intelligently what costs are justified.

Contractors also pointed out that engineers might better specify results desired rather than methods, and leave it to the ingenuity of the builders to produce those results. If specifications mention a specific type of equipment, contractors said they wanted payment by the hour for such machines. One contractor urged more study on dam

construction to balance the cost of compaction against results.

Contractors and engineers alike have now become well aware of the danger of putting a well compacted embankment on a subgrade that is too weak to support it. Initial studies of the original ground are all too infrequent, some of the delegates said, and more careful ground studies were urged. One delegate told how a fine embankment, compacted to a density of 98 per cent of optimum, split wide open in the middle

when both ends of the original ground settled beneath it.

Most state specifications, as well as Federal agency requirements, now are aimed at results rather than methods. However, certain modified controls as to methods employed are still necessary, to prevent the rejection of construction that is badly needed. It was pointed out that the engineer, if he stuck exactly to results instead of methods, would be under tremendous pressure to accept a job when he made his final inspection. State and Federal engineers favored a continuation in modified form of the practice of specifying methods as well as results.

Contractors said that on several jobs, inspectors required sheepfoot rollers to continue rolling after the minimum

densities were obtained. Testing engineers, too, were found to be much more available on jobs on which the rolling was paid for by the hour. The entire science of designing equipment, plans, construction procedures, and proper inspection for soils work is still complicated and hindered by specifications which are not uniform for exactly the same types of work.

One highway department reported that it tries to work with its contractors with special emphasis on the early part of the job, with a view towards attaining good results as quickly as possible. It urges its inspectors to test less and observe more. Though the state is located in a rainy section of the country, the department has found that soils

(Continued on next page)

## Introducing the New

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### No. 610



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work in poor soil, with good moisture control, will let its contractors work more days per month due to better stability of the fills.

Vibratory rolling, now being introduced, seems suitable for granular soils. By using vibratory equipment, much destructive differential settlement will be eliminated or reduced, especially in sandy material. Special vibratory tables have been developed in several laboratories to check the results and compaction potentials of various granular soils. While there is some promise that vibratory compaction may be possible in the future on plastic soils, it is not yet a reality.

While mass weight is important in compaction work, it is not the entire answer, one soils technician said. He

gave instances where the passage of heavy hauling equipment had ruptured well compacted soil and caused it to fail.

Various engineers have come to realize that density is different than supporting power. One engineer urged the delegates to start thinking in terms of supporting power or bearing value in highway and airport work, and to think less in terms of densities as such.

#### Soils-Construction Equipment

Under the chairmanship of E. A. Willis, Senior Highway Engineer of the Public Roads Administration, the development and use of equipment for soils construction came up for a thorough review by the assemblage. Equipment for boring and sampling, various

types of rollers, all types of earth-moving units, portable crushing and screening plants, stationary and traveling plants for stabilization projects, and machines for installing vertical sand drains were discussed.

With engineering soils maps now being generally used on a larger scale than ever before, the use of supplementary drilling and investigating equipment is more important than ever. One of the great needs for investigative work, the highway engineers agreed, was the development of a small, portable, but powerful rig for determining the depth of overburden over shallow deposits.

An investigating machine to recover undisturbed samples of material was developed in California under the efforts of Jim Porter, and Porter-type

machines for sampling are now being made commercially. In marshlands of New Jersey, Wisconsin, and Delaware these machines have probed 80 to 100 feet deep with hand-driven pipe. The small 1-inch Porter tube can be driven by a sledge hammer, and the 2-inch size will go much deeper. It is machine-driven.

One state reported using Buda drills on a 6-wheel-drive truck with good results. California is now developing a small, mobile machine to dig 6, 8, and 10-inch holes in anything but hard rock.

It was pointed out that no single machine or tool is the entire answer to exploration work. Area soil maps should be used, geological interpretations of land forms made, and extensive studies undertaken in connection with the actual borings. Last year New Jersey drilled 97,000 linear feet of exploration holes.

Seismograph methods, Jeep-mounted drills, and electric-driven augers and drills were also discussed as a partial answer to the shortage of probing and investigation equipment.

Earth-moving equipment, too, came in for its share of discussion. Its growth was traced: the evolution of equipment from hand to mule to steam shovels to gas shovels to trucks. Recently, on one job, 50,000 tons of earth was moved in 16 hours by special pneumatic-tired trucks.

There is an interesting parallel between the mule-scraper days and the present, the contractors were told. In the old days, one of the big complaints was that mules "ate their heads off" between jobs. It is as true today. Good contractor organizations must keep occupied with a steady volume of work if they are to operate efficiently and be able to set standards of competition.

Most contractors believe that earth-moving equipment will not get much bigger, because bigger and heavier machines are not economically practical under contracting methods foreseeable in the next decade. But still, many earth-moving machines today are so massive that special permits have to be issued by state highway departments to allow the machines to move to the job.

If big measured by machines, highway construction is even bigger measured by dollars. For example, it was pointed out that California's 504 contractors have a prequalified bidding potential of \$1,000,000,000, but are engaged in only \$75,000,000 worth of work on 224 active jobs. While construction work is now under way at a rate of \$2,500,000 per week in California, engineers concluded that contractors there could handle much more construction work in a competitive manner.

Compaction-equipment manufacture poses one of the big problems these days, contractors and engineers were told. One manufacturer, citing the requirements for sheepfoot rollers, said that every state and every agency had different standards for the sheepfoot roller, one of the simplest of all compaction or construction tools. The issue regarding sheepfoot rollers has become so confused through meaningless obfuscation, this manufacturer said, that compaction itself is suffering.

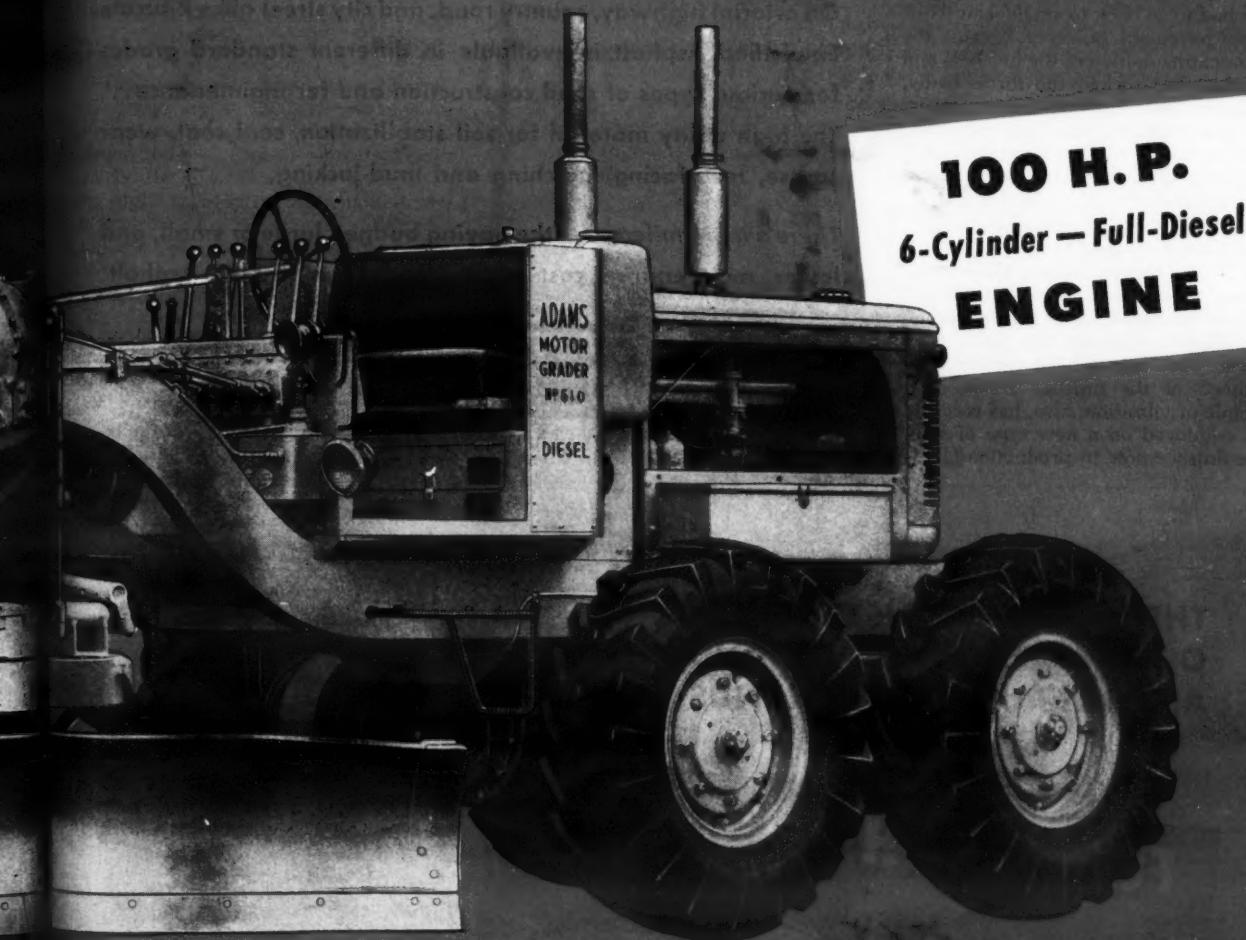
For example, a sheepfoot roller can be built to meet exactly the specifications of one agency. Its feet will be properly spaced, its tamping area correct. Yet because no such thing as pressure or mass weight is mentioned, he pointed out, the finished roller might be inferior and ill-suited for compaction.

It was suggested that sheepfoot-roller specifications be simplified to permit only three or four types or sizes. One delegate added that too much tractor drawbar pull was being wasted on sheepfoot rollers. Since it requires about 500 pounds of drawbar pull for each ton weight of roller, specifications

(Continued on next page)

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## Road Builders Discuss Methods, Equipment

(Continued from preceding page)

might well state what compactive effort is wanted on the processing of soils.

Smooth-wheel rollers are not generally used for soil compaction, but they work well on shale embankments. One manufacturer has acquired a Danish patent which provides for vibration of the middle roller on a 3-wheel tandem-type machine.

Pneumatic-tire rollers are more standardized than sheepfoot-type rollers, but here, too, the delegates agreed that some improvement was possible. Massive pneumatic-tire rollers designed to put as much as 200,000 pounds on a wheel have been used successfully to pre-stress a sub-base prior to paving. The use of larger, more massive pneumatic rollers shows some promise, and at least one new pneumatic roller especially suited to the pre-stressing of highway subgrades is being developed.

The first vibratory roller is now in production, delegates were told, and may sell for as low as 25 cents per pound with the vibrating unit installed. Tests so far have been good, especially on granular soils. On one test project, one pass with the vibratory compactor improved on the results obtained with 400 trips of pneumatic rollers and brought the compaction to a point above specifications.

In regard to present-day crushing equipment, nearly all the delegates agreed that the new portable plants are especially well suited to construction work. The crying need on all makes of portable plants is a fast, accurate device to take a representative sample of the material being produced. With stiff base-course specifications, and with grading and plasticity index ratings tight, engineers need more than ever to get representative samples of crushed material.

For stabilization work, one of the pieces of equipment discussed was the rotary Pulvi-Mixer, which has operated efficiently in several states and helped to perform low-cost stabilization of road bases. One state reported that the Pulvi-Mixer broke up exceedingly difficult soil.

### Concrete Machines

Ben H. Petty, Professor of Highway Engineering of Purdue University, and Bailey Tremper, Materials Engineer, Washington State Highway Department, as Co-Chairmen, presided over a meeting devoted to the development and use of equipment for concrete construction. Forms, concrete-batching equipment, mixers, pavers, spreaders, finishing machines, and vibration were brought up.

One manufacturer said that so far as is known, present-day steel road forms at 7 1/4 cents per pound represent the cheapest cost of any fabricated steel item made in the United States. However, the forms represent a considerable investment and should not be abused.

The worst enemies of concrete forms are insufficient base tamping, and the use of mechanical force to pull the entire form section with its stakes intact. These practices cause forms to rock, and make good progress difficult for the form-setting crews. A light mechanic's hammer should be used for snugging up the steel keys around the stakes.

In the matter of concrete-batching equipment, the size of bins and accuracy of scales is of paramount importance. California now insists on fully automatic batching plants on all jobs over 3,000 yards to insure maximum accuracy. It was pointed out that automatic plants are a good investment for contractors as well, because they tend to increase production and can be operated quite easily.

When a commercial aggregate producer questioned the ability of the auto-

matic plant to produce various mixes, it was pointed out that as many as 12 pre-selected mixes can be batched at a second's notice. In general, it was agreed that the automatic batching plant is the most significant development in concrete-paving equipment in years.

Concrete pavers are now regarded as satisfactory for almost all types of work. Modern 34-E's, giants of their line, have set the pace which developed adequate spreading and finishing machines. Several delegates pointed out that the use of air-entraining agents was not a cure-all for segregation, for poorly designed mixes, and lack of workability. Without ruling for or against the general use of air entrainment, they agreed that the use of air-entraining agents in concrete mixes should proceed only after carefully considering the situation and determining definitely that this would help.

It was pointed out by one research technician, however, that air-entraining agents might solve many a situation where harshness of mix was involved.

The two types of mechanical spreaders, screw and blade-type, are now regarded as essential tools in concrete paving, and are easy to operate. Finishing machines, too, have been improved, and can now keep pace with present-day pavers.

One diagonal-screed finisher has now been developed which permits the concrete to be moved laterally as well as longitudinally. Because the screed power is independent, it can travel slowly and screed rapidly, or hit any combination. It has wider shoes on its screeds, interchangeable crown changes, and smoother action.

At least three main western states have had to go back to single-lane 11 or 12-foot pavement, however, because the reciprocating motion of the finishers and spreaders has rocked the forms badly. Spreader and finisher improvements may soon remove this difficulty. The development of the drag finisher, also, has made final surfacing of concrete more accurate.

Concrete vibration on highway pavements is more general in other countries than in the United States. Some contractors are coming to regard surface vibration as beneficial to finisher progress. Where vibrators are used, they seem to work best behind the spreader or ahead of the finisher frame. The principle of vibration, also, has recently been employed on a new type of sub-grade finisher now in production.

### Bituminous Equipment

T. E. Stanton, Materials and Research Engineer for the California Department of Public Works, presided over the meeting which dealt with the development and use of equipment for bituminous construction. In this meeting, such things as plant mixers, driers,

finishers, distributors, and equipment for the compaction of bituminous mixes were discussed.

Recent studies have shown that the continuous-mix type of asphalt plant, when it is in good running condition, is as accurate as the batch plant. However, (Concluded on next page)

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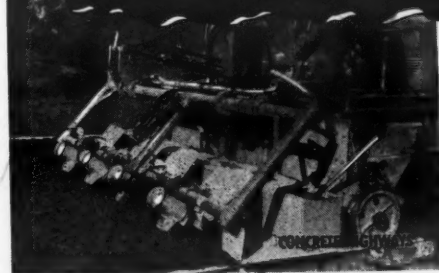
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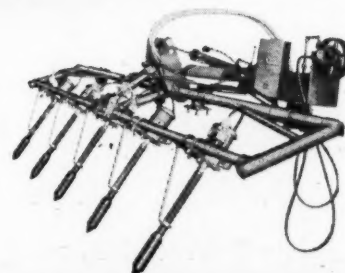
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considerable difficulty is being experienced in the volumetric measurement of asphalt. Where asphalt foaming occurs, correct measuring is difficult.

On asphalt plants, too, it is difficult to get good representative samples of the mix. Manufacturers were urged to develop some device to meet this need. When sampling must be done, one technician reported, the best place to get the material is directly behind the finisher. Even so, a small trench must be dug all the way across the lane to insure a representative sample.

The drier is the most important key to the production of an asphalt plant, and in general it limits the size of portable plants. Bigger driers could of course be made, but they could not be readily transported over the highways. The harmful effect of too-hot rock from the drier on asphalt in the pugmill was stressed, also.

In the bituminous field, the engineers and maintenance men need most of all a really good distributor, according to many of the delegates. Full pressure on the spray bars, heat and uniformity at the spray tips, ample pump pressure, and easy cleanout facilities are a few of the most urgent needs.

Tests on distributor tips showed a wide variance in application. The Argentine government has an Italian machine with precision-machined nozzles, and the English have a precision cone-shaped spray. Both were reported superior to American equipment. The variance in application rates of standard American tips was reported by one widely known highway maintenance engineer as "astounding" on the basis of tests his department recently conducted.

However, at least one American manufacturer has set up production facilities for a precision-machined distributor tip.

Bituminous finishers with longer wheelbases up to 30 feet are now in production, and a heavy-duty 2-axle tandem roller so concentrates its weight that better pavements are being laid. One highway construction engineer reported that this roller cut in half the roughness of a pavement recently measured before and after by the Public Roads Administration "Roughometer".

In addition to the technical meetings, luncheon addresses were given. J. T. Callaway, President of the American Road Builders' Association, spoke on the aims of ARBA, its objectives, and its coming July Road Show. The background and objectives of the Highway Research Board were discussed by M. Earl Campbell of the Technical Staff of the Highway Research Board.

Delegates reported that this was one of the most informative meetings ever to be held in the west.

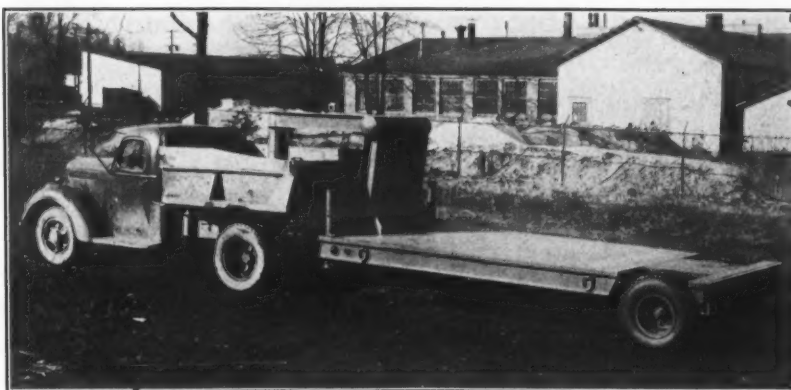
### New Department of AGC

#### For Contractors' Research

A Department of Research has been formed by The Associated General Contractors of America, Inc. Its principal purpose will be to study and correlate information on contract documents and specifications, uses of construction equipment and costs of owning it, and construction statistics.

Headquarters for the new department are in the national offices in the Munsey Bldg., Washington 4, D. C. Harry J. Kirk is department Manager. Mr. Kirk has been Manager of the Highway Contractors' Division for a number of years. He will also continue as Safety Director of the AGC.

New Manager of the Highway Contractors' Division will be Archie N. Carter. Mr. Carter will also act as Co-Secretary of the Joint Cooperative Committees between the AGC and the American Association of State Highway Officials and the National Association of State Aviation Officials. Mr. Carter is well known in the engineering and construction-magazine field.



The Mead B-10 semi-trailer is designed for handling small shovels, bulldozers, rollers, etc. It has a maximum carrying capacity of 10 tons.

### Ten-Ton Semi-Trailer

A 10-ton trailer designed for use with standard dump trucks is announced by Mead Machine & Iron Works, Inc., 606 Lexington Ave., Warren, Pa. The B-10 is suitable for attaching to dump bodies not more than 6 feet wide x 8½ feet

long, and 6½ feet high at the tail-gate hinges. A feature of the Mead Hevitrailers is that they require no alterations to the truck or body. They are designed for correct load distribution on the trailer and truck, with the resulting traction, steering, and braking advantages.

The B-10 has four 8.25/15/12 rubber tires, mounted on Budd disk wheels. The fifth wheel is built integral with the neck and is of a Mead design. The trailer has a fixed-position non-adjustable gooseneck connection. The length from the back of the gooseneck to the rear bumper is 15 feet. The deck height is 31½ inches, and the tires come 2 inches above the platform. The floor is made of 2-inch-thick hard wood. The unit has air or vacuum-operated brakes, and is furnished with lights and signals to meet ICC and local specifications. Weight of the Mead B-10 Hevitrailer is 6,100 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 49.

### Detroit Diesel Promotion

Raymond K. Collick has been named Parts Merchandising Manager of the Detroit Diesel Engine Division of General Motors Corp. He has been with the division since 1937.

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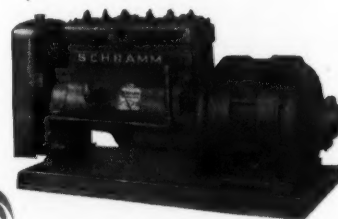
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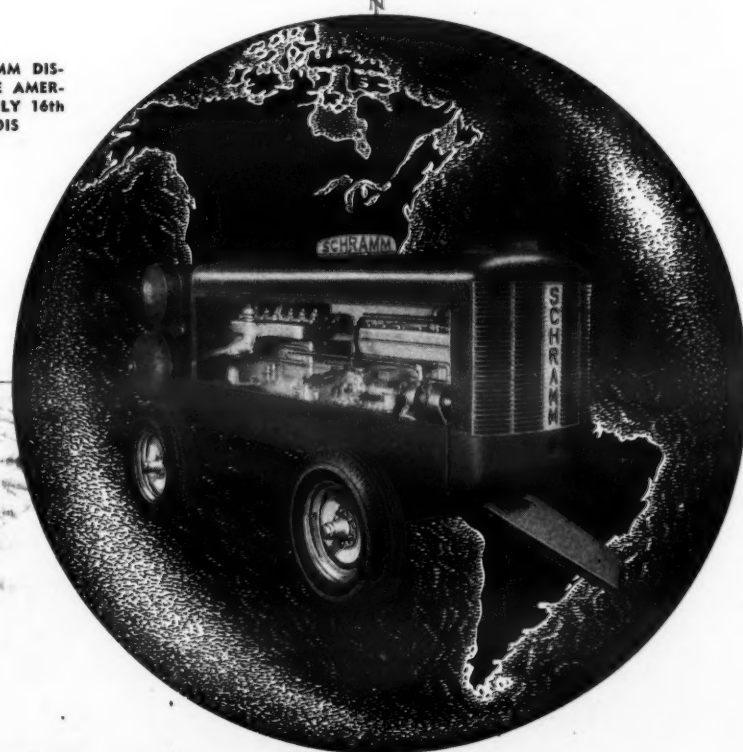


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The Di-Met concrete cutter has a hydraulic retardant which eases the diamond cutting wheel into concrete without sudden shocks. The unit has a 10-hp gasoline engine.

### Cutter for Concrete Is Gasoline-Driven

A machine for cutting concrete is made by the Felker Mfg. Co., Torrance, Calif. It features a hydraulic retardant designed to ease the diamond cutting wheel into concrete without causing sudden shocks. The wheel, while cutting, is flooded with water from a tank mounted on the Di-Met cutter. The water is automatically turned on as the blade is lowered and shuts off when it is retracted, the manufacturer explains.

The Di-Met is equipped with a Fairbanks-Morse-Onan 2-cylinder 10-hp gasoline engine. This is said to provide sufficient power so that the speed of the wheels is not materially influenced by sudden changes in depth of cut or other causes of increased load. Weight of the unit has been so balanced that the front or rear wheels can be lifted by means of the curved handles.

The spindle is mounted in ball bearings and is double-ended, permitting either right or left-hand operation of the cutting wheel. A pointer attached to the frame is adjustable for alignment with the diamond wheel in order to aid in lining up the cut. The Felker Di-Met segmented-type diamond wheel is specially designed for use with this cutter. It is made of tempered steel with diamond sections as inserts. The machine accommodates wheels up to 18 inches in outside diameter to permit a 6½-inch maximum depth of cut.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 40.

### Radiators Kept Clean By Organic Detergent

A compound for keeping automotive cooling systems clean is announced by The Curran Corp., So. Canal St., Lawrence, Mass. It is said that the new Gunk compound will aid in degreasing and scouring scale, rust, and algae from radiator cores and engine blocks without harm to the metal or hose of the cooling system. It is described as a tri-phase detergent of the organic type.

The compound is applied directly to the system through the radiator opening. It needs no neutralizer, nor does it require immediate flushing. The manufacturer explains that the compound can be left in the radiator until the regular draining periods. The purpose of the chromate in the compound is to inhibit ferrous metals from rust and scale formation. It is unaffected by, and does not affect, anti-freeze solutions.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 45.

### Morse-Formsprag Sales Div.

The Morse Chain Co. Division of Borg-Warner Corp., Detroit, and the Formsprag Co. of Ferndale, Mich., have jointly announced the formation of the Morse-Formsprag Sales Department. Headquarters will be at 7601 Central Ave., Detroit 8, Mich. Morse-Formsprag has developed a new line of over-running clutches for industrial use to supplement Morse's present line of mechanical-power-transmission equipment.

### Brow-Sweat Absorber

A sponge-rubber headband to control perspiration all around the head and thereby increase the wearer's production is made by the Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa. The Coolband is designed to prevent sweat from dropping into the wearer's eyes or onto his glasses or goggles, and to keep him from having to stop work constantly to mop his face.

The M. S. A. Coolband is said to cling to the head without binding. It is cleaned by squeezing in soapy water. And it may be disinfected the same way with any germicidal solution which will not affect sponge rubber.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 39.

### Automatic Steam Boilers

A line of automatic steam boilers is described in a bulletin issued by Alert Engineering Products, 315 W. Woodbridge St., Detroit 26, Mich. The Alert boilers are made in a 22 to 50-hp range, will deliver steam at pressures of 100 pounds or higher, and can be either oil or gas-fired. Gases used may be natural, mixed, manufactured, or bottled.

The bulletin lists what it describes as fifty important and exclusive features of the Alert Hot Steam boilers—features which apply to their construction as well as their operation. Also shown in Bulletin No. 127 are pictures of four of the units which the company can provide.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 88.

### Powered-Wheelbarrow Data

A descriptive pamphlet on its powered wheelbarrow is being distributed by the Bell Aircraft Corp., P. O. Box 1, Buffalo, N. Y. The Prime-Mover has a 3-hp engine and a capacity of 1,000 pounds. Its volume, 10 cubic feet, can be increased to 18 by the use of sideboards. In addition to the barrow, it can also be equipped with a flat plat-

form deck or a snow-plow attachment.

The catalog points out the various features of the Prime-Mover and its adaptability for many different types of jobs. Photographs show it in use, and text describes its features. The booklet stresses the unit's versatility combined with low cost of operation.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 82.



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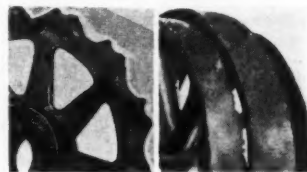
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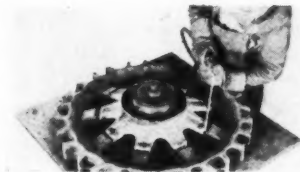
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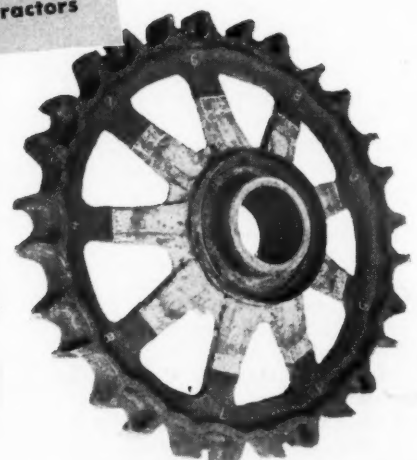
**3 YOU OBTAIN A NEW, TOUGH, WEAR-RESISTANT MANGANESE STEEL DRIVE SPROCKET OR IDLER WHEEL RIM LIKE THESE**  
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# Macadam and Hot-Mix Surface Old Concrete

## Penetration Base Course Of Stone or Slag Is Laid On Cracked Pavement as a Foundation for Black-Top

HEAVILY traveled U. S. 20 or State Route 78, just east of Buffalo, N. Y., in Erie County, has been improved under a paving contract which covered 8 1/4 miles, beginning at Orchard Park and running northwards. This stretch of 30-foot concrete, known as Southwestern Boulevard, was built between 1927 and 1929 with three 10-foot lanes. Over the years the pavement had become cracked and uneven, requiring excessive maintenance, and because of its rough riding condition was a serious traffic hazard.

Accordingly the New York State Department of Public Works, District 5 with headquarters at Buffalo, awarded a contract for the improvement of this road to Asphalt Roadways Co. of Buffalo, N. Y., on its low bid of \$411,047.20. Chief features of the contract were (1) constructing a 4-inch penetration-macadam base course over the 30-foot disintegrating concrete pavement, and (2) topping this foundation with two courses of plant-mix asphaltic concrete. Both crushed stone and slag were used in the new base work because it was difficult to obtain the total required amount of either material alone.

Work on the contract got under way July 30, 1947, when trenching began 6-inch drain tile on either side of the highway. Trenches 21 inches deep were dug by a Barber-Greene ditcher, and the contractor was able to lay an average of 4,000 linear feet of pipe a day. The tile drains to low points in the roadbed where tile spur connections were made out to the ditch line.

Penetration work began September 3, 1947, and was completed in 25 working days. The State Engineer allowed the work to progress beyond the deadline of October 15 because of favorable weather conditions.

### Penetration Base Course

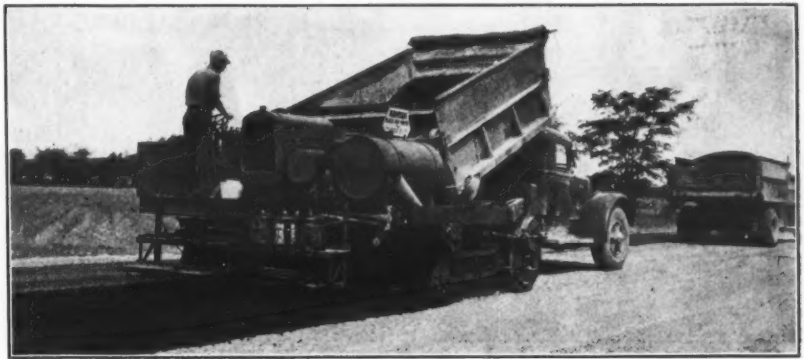
Part of the penetration base course was built with slag, and part with crushed stone, depending on whichever material was available. The slag was obtained from the Buffalo Slag Co., Inc., and the stone from the Federal Crushed Stone Corp., both located in the Buffalo area and about a 14-mile haul from the job. All the material was delivered to the project by the DiNardo Trucking Co. of Buffalo, and paid for on a tonnage basis. From 18 to 26 trucks, averaging 12 tons a load, hauled the base-course aggregate which consisted of a 50-50 mixture of No. 3 and No. 4 sizes conforming to the following gradation:

Sieve Size	Per Cent Passing	No. 4	No. 3
4-inch	100	100	100
3 1/4-inch	90-100	100	100
2 1/4-inch	Not over 15	90-100	100
1-inch	Not over 15	Not over 15	Not over 15

The aggregate was spread over the existing concrete by an Adnan Black Top Paver, one 10-foot lane at a time,

beginning with the west lane and completing that before moving over to the center lane. In this way traffic was maintained at all times. The trucks fed the material to the paver which spread it to a loose depth of 4 1/2 inches. It was compacted to 4 inches by rolling with a Buffalo-Springfield 10-ton 3-wheel roller.

When a lane of base course was completed, it was then given a penetration shot of 100 to 120-penetration asphalt applied at the rate of one gallon to the square yard. The bitumen was furnished by The Barrett Division of the Allied Chemical & Dye Corp., which has an asphalt plant at Cheektowaga, a suburb of Buffalo, and by the Allied Bitumens Co. also at Cheektowaga—a 7-mile haul distance from the center of



C. & E. M. Photo

The Adnan Black Top Paver used on the Asphalt Roadways Co. job gets a load of base-course material from an Autocar truck hauling 12 tons of plant-mix.

the job. It was also applied by the asphalt suppliers with a 1,200-gallon distributor at a temperature ranging between 300 and 325 degrees F. For the center lane a 10-foot bar was used, but on the outside lanes the width was increased to 11 feet to take care of any stone that might have feathered out

along the edges.

To prevent the formation of fatty spots of bitumen at the start of a run, when the distributor may release too much asphalt before the truck gets moving, a strip of building paper, 3 feet wide, was stretched across the lane

(Continued on next page)

## The WOOD PREPARIZER

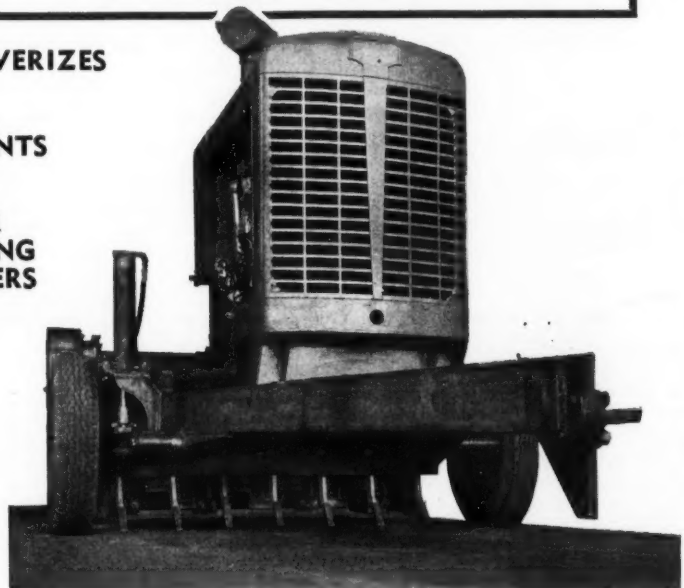
IT

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ASPHALT AND  
MACADAM PAVEMENTS

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WITH LIQUID BINDERS  
OR SOIL CEMENTS

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FOR ROADBUILDERS AND  
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## Macadam and Hot-Mix Surface Old Concrete

(Continued from preceding page)

being shot. The paper caught the first burst of bitumen before the distributor truck got rolling along.

### Chinking, Rolling, and Brooming

The voids in the base-course aggregate were then filled with either slag or stone chips, No. 1 size, passing the 1/2-inch screen but retained on the 3/4-inch. The material was hauled from the same sources that supplied the larger aggregate, in three trucks on the average. It was distributed from Burch gravity spreader boxes hooked to the tail-gates of the trucks which backed over the lane of base course. The finer material was then rolled into the coarser aggregate by a Buffalo-Springfield 8 to 10-ton tandem roller.

Excess loose stone was later swept off the surface by a Grace rotary power broom pulled over the lanes by an International I-9 rubber-tired tractor. Thus a roughened base-course surface was presented for the hot-mix, resulting in a better bond between the two.

### Asphaltic Concrete

The plant-mix asphaltic concrete was also laid by the Adnun Black Top Paver in two courses—a base course 1 1/4 inches thick after compaction, and a top course 3/4 inch thick after compaction. The Barrett Division, the Bituminous Products Corp., and the Buffalo Crushed Stone Co. supplied the material from their asphalt plants where it was mixed in a 2-ton pugmill. An average fleet of 7 trucks owned by the DiNardo Trucking Co. hauled 6 batches each—with a total weight of 12 tons—to the paver. The material was laid at temperatures ranging from 180 to 225 degrees F.

At the end of the day's run a 3-foot-wide strip of building paper was laid across the width of the base-course lane which was being paved. When the paver passed over the paper, no more plant-mix was laid. After the mix was rolled, the pavement was chopped out with mattocks along the back edge of the paper, which was then lifted out, carrying along whatever material had been placed on top. In this way a square-cut joint was always present when paving on that lane was resumed. The paper, of course, prevented the asphaltic concrete from sticking to the base course.

To keep the paver on line, pins were set 14 inches off the edge of pavement on 50-foot centers. The pins were connected by a string which the paver operator followed by means of a gage projecting out the side from the front end of the paver.

Directly behind the paver the surface of the black-top was checked for irregularities with a 16-foot straight-edge, and any necessary adjustments were made by the rakers and shovels. Their tools were kept clean in a bucket of kerosene carried along on the paver. The pavement was then rolled, first by an 8 to 10-ton tandem roller, and then by a 14-ton 3-axle tandem roller. Both were Buffalo-Springfields. When a large run of black-top was laid, another 10-ton roller was employed to roll the mix; generally three rollers were used.

The composition of the two courses of asphaltic concrete mixed by the Steamix steam-dispersion process was:

Sieve Size		Per Cent by Weight	
Passing	Retained	Base	Top
.....	1-inch	0-5	.....
1-inch	3/4-inch	35-60	0-5
3/4-inch	3/8-inch	20-40	15-40
3/8-inch	1/4-inch	5-20	25-45
1/4-inch	No. 80	5-15	15-45
No. 80	.....	0-5	0-12

Asphalt cement, penetration 100-120 and 50-120

3-5

5-7

The work was completed in 33 work-

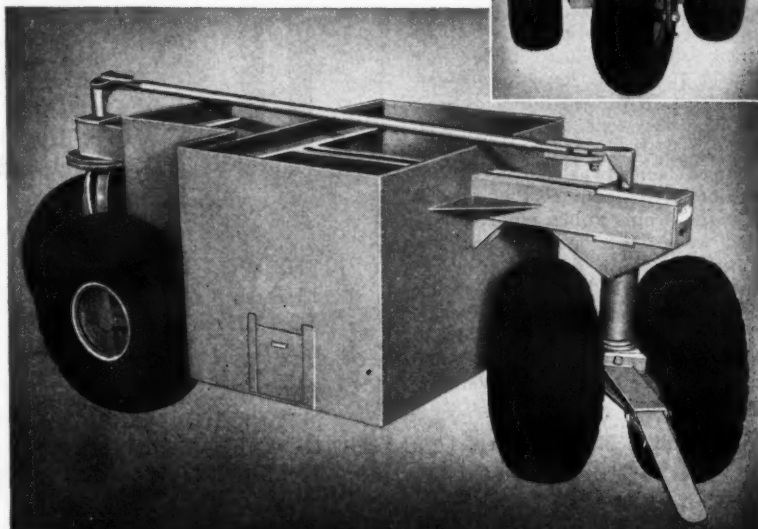
A Barrett Division 1,200-gallon distributor gives the new macadam base course on U. S. 20 a penetration shot of 100 to 120-penetration asphalt (first photo). Notice the strip of building paper which catches the first shot of bitumen. Then a Burch spreader box spreads the chink stone (second photo), and a Grace rotary power broom pulled by an International I-9 tractor (third photo) sweeps excess loose stone from the surface before the black-top is laid.

ing days. The black-top was laid by a crew of 8 including the paver operator, the screed man who also checked the thickness of the course and handled the straight-edge, 2 rakers, 2 shovels, and the roller operators. A service

truck supplied the paver and rollers with water from a 250-gallon tank which it carried. In a 10-hour day, from 600 to 900 tons of plant-mix was laid with the single paver. While one lane (Concluded on next page)

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- Accurate weight calculation
- Operates up to 15 m.p.h.
- Turns at sharp angles

One highway engineer wrote, "The Cemco Flat-Iron Roller does a good job in places that would have been impossible with any other type of roller that I have seen." This pneumatic-tired roller will smooth as well as compact stabilized bases, bituminous "cold-lay" surfaces and seal-coat aggregates. Water won't work into the soil when the Cemco Roller follows up the blading operation to seal the dirt fills.

It will carry a terrific weight load—128 cu. ft. of sand. This gives you a 10-ton roller when fully loaded. The low center of gravity permits work on shoulders and otherwise inaccessible places. Five tires overlap to make a 72" to 75" compaction path.

Roller-bearing equipped, you can tow it to and from the job at 50 m.p.h. Can even be used as a snow packer, trailer or emergency sprinkler.

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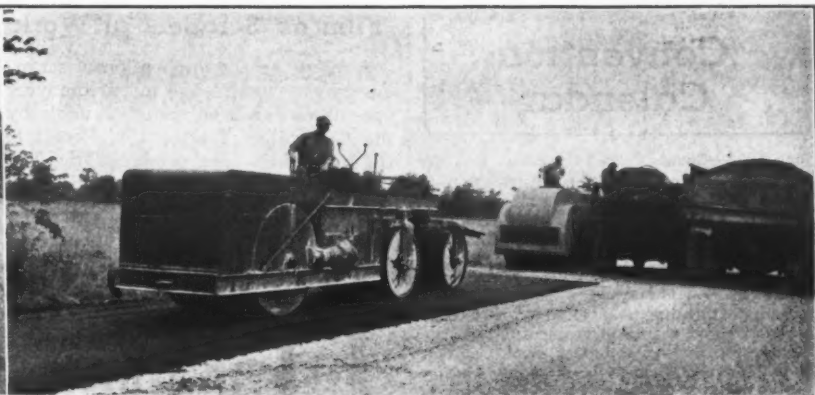
## WELLMAN

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C. &amp; E. M. Photos

was under construction, the other two were kept open for traffic. The transverse joints between the 10-foot lanes were staggered.

The average daily production of base stone laid was from 1,100 to 1,200 tons. With reference to the asphalt penetration, as much as 7,200 gallons of bitumen was applied in one day.

As the paving was completed, the shoulders were leveled off and shaped by two motor graders, a Galion and a Caterpillar. The graders had also been used to backfill the tile-underdrain trenches with sand, which satisfied the requirements for porous backfill. About 75 per cent of the entire contract is complete. A few headwalls and some culvert extensions, plus grading and trimming the shoulders, are all that remain to be completed during this construction season.

#### Quantities and Personnel

The major items in the contract included the following:

Excavation	45,000 cu. yds.
Underdrain, 6-inch	87,300 lin. ft.
Asphaltic concrete	18,600 tons
Asphalt for penetration	150,000 gals.
Stone or slag base-course macadam	16,500 cu. yds.
Porous backfill over tile	4,850 cu. yds.

The Asphalt Roadways Co. employed an average force of 17 under the direction of John Levecchi, Superintendent. The men drank from Dobbins portable drinking fountains. For the New York State Department of Public Works, H. D. Parker was Resident Engineer. The 5th District of the Department, with headquarters at Buffalo, is headed by Charles R. Waters, District Engineer. H. J. Ludden is Supervising Engineer. Charles H. Sells is Superintendent of Public Works.

#### Steam-Detergent Cleaners

A catalog describing the theory and application of steam-detergent cleaners has been put out by Oakite Products, Inc., 172 Thames St., New York 6, N. Y. Presented as a service report, the folder features an explanation of the three actions involved in steam-detergent cleaning: the physical action of steam pressure and hot water working their way through layers of grease and dirt; the dissolving action of heat on oil, grease, and other deposits; and the chemical action of the detergent in wetting, penetrating, and emulsifying sur-

face deposits.

The report goes into detail about the materials and methods used in this type of cleaning. It tells how the solutions are prepared and how the equipment is installed. It also describes some tests conducted by the company to determine the efficiency of Oakite equipment, and lists some applications of that equip-

The Adnan Black Top Paver at left, which Asphalt Roadways Co. used on its macadam and hot-mix paving contract near Buffalo, is supplied with water from a Ford truck carrying a 250-gallon tank. Behind the paver, the surface of the black-top is checked with a straight-edge. Then the pavement is rolled (photo at right) by a Buffalo-Springfield 14-ton 3-axle tandem roller following another B-S 8 to 10-ton tandem roller.

ment—cleaning construction machines, cleaning concrete mixers, paint stripping, etc. It also contains data on three models of the Oakite solution-lifting

steam guns.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 71.


## What It Takes FOR HEAVY HAULING



When you buy a GMC for heavy hauling you get a truck that's heavy duty and all truck. GMC heavy duties have big, brawny frames . . . with wide, thick-leaved springs to match. They have heavy, husky axles and transmissions that combine to provide as many as 15 forward speeds . . . brakes up to 21 inches diameter . . . heavy disc clutches. Engines are powerful valve-in-heads . . . with extra heavy Tocco-hardened crankshafts and many other durability features. Yes, GMC heavy duties have "what it takes" . . . and many models are now available for quick delivery.



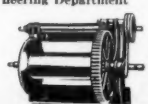

The massive frame, heavy springs and rugged radius rod drive of this dump model typify GMC heavy duty truck design. GMC heavy duties are built in gross weight ratings of 19,000 to 90,000 pounds, for every hauling job. See your GMC dealer.



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## Convention Calendar

### June 21-23—County Officials Meeting

Annual conference, National Association of County Officials, Hotel George Washington, Jacksonville 2, Fla. NACO Housing Committee, Tourist and Convention Bureau, Jacksonville, Fla.

### June 21-25—ASTM Meeting

Annual meeting and exhibit of testing apparatus and related equipment, American Society for Testing Materials, Book-Cadillac Hotel, Detroit, Mich. C. L. Warwick, Executive Secretary, 1916 Race St., Philadelphia 3, Pa.

### July 16-24—ARBA Road Show

Road show, American Road Builders' Association, Soldier Field, Chicago, Ill. Charles M. Upham, Engineer-Director, International Bldg., Washington 4, D. C.

### July 21-23—ASCE Meeting

Summer convention, American Society of Civil Engineers, Olympic Hotel, Seattle, Wash. Col. William N. Carey, Executive Secretary, 33 W. 39th St., New York 18, N. Y.

### Oct. 2-10—Construction Exposition

Construction Industries Exposition, Houston Chapter, Associated General Contractors of America, Inc., L. W. Duddleston, General Manager, or Russell W. Nix, Chairman, Exposition Committee, AGC Office Bldg., Gray and Crawford Sts., Houston, Texas.

## Concrete-Pavement Design

The report of its committee on concrete-pavement design has been issued by the American Road Builders' Association. Bulletin No. 121, 1947, deals with subgrade soil practices and the structural features of concrete pavements. It also covers concrete materials, proportioning, placing, finishing, and curing. The study is a report of present practice concerning concrete pavements, and represents the results of a fact-finding survey conducted by the ARBA.

Each of these major topics is discussed by an expert in that particular phase of concrete-pavement design. Accompanying the various reports is a tabulation of the data received in answer to the questionnaire sent out by the ARBA. These data are broken down by states and indicate the standards adopted by each state in regard to each of these subjects.

Copies of the bulletin can be obtained by writing to the Association at 1319 F. St., N. W., Washington 4, D. C. Price of the book is \$1.00.

## Steam-Cleaner Plant Opened

Climax of a \$400,000 post-war expansion program was marked recently when the Homestead Valve Mfg. Co. formally began production of its Hypressure Jenny steam cleaners in its new Coraopolis, Pa., plant. This 40,000-square-foot plant has facilities for production of 5,000 units monthly. General contractor for the job was Rose & Fisher, of Pittsburgh. The building was designed by architects Prack & Prack and Consulting Engineer Robert A. Wallace in conjunction with the Homestead Valve engineers.

## Film on Scrapers at Work

A movie on the application of scrapers over a wide range of earthmoving operations has been made available by the Caterpillar Tractor Co., Peoria 8, Ill. The film was produced by The Calvin Co., Inc., Kansas City, Mo.,

with photography by Caterpillar cameramen. It employs special techniques for depicting the operation of heavy machinery and the action pattern of the moving earth. Highlights of the picture are overhead and worm's-eye views showing the complete action when loading and unloading the scrap-

ers.

This 16-mm full-color sound film shows the Caterpillar tractor-scraper combinations at work stripping, cutting, and leveling, working both with and without push tractors. The film is available to interested parties upon request.

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**CP-111 (25 lb. class).** For lateral or overhead work where light weight is essential; for tearing down walls where precarious footing makes use of heavy tools dangerous.

**CP-113 (35 lb. class).** For light demolition jobs, the light weight and fine balance of this tool makes rapid operation easy. Also useful for lateral or overhead work.

**CP-115 (60 lb. class).** A general utility demolition tool, with ample power for any but the heaviest duty; also suitable for spike driving.

**CP-116 (80 lb. class).** Delivers a fast, powerful blow, adapting it for cutting and breaking heavy asphalt and medium weight concrete, for demolishing foundations. Makes an excellent sheeting driver.

**CP-117 (80 lb. class).** Striking a slower, but much heavier blow than the CP-116, this tool is designed for use in hard, dense concrete, and other medium-to-extremely hard material. As a spike driver it's unbeatable. There's no job too tough for the CP-117.

CP-113 Demolition Tool; 35 lb. class. Available with double-grip or closed handle, spring-type or latch retainer.



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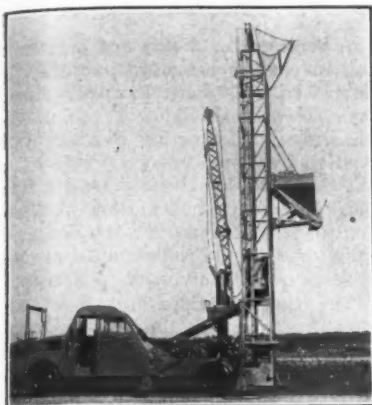
**"Trading Post"**

See pages 110 and 111

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470 Fourth Ave., New York 16, N. Y.



The Towermobile-Crane is a further development of the Towermobile. Now, in addition to the tower with its lifting capacity of 6,000 pounds, the combination unit features a 20-foot boom and a 9,000-pound capacity.

### Crane Boom Is Added To Mobile Tower Unit

The addition of a crane boom to the Towermobile chassis is announced by Mixermobile Manufacturers, 6855 N.E. Halsey St., Portland 16, Oreg. This has been accomplished without any changes affecting the operation of the Towermobile, the manufacturer explains. The Towermobile-Crane has a maximum capacity of 9,000 pounds. Its 20-foot boom can be increased in increments of 10 feet, up to a maximum of 40 feet.

An unusual feature of the combination is the fact that the tower can be completely removed from the chassis by the machine's own boom. Boom swing is 360 degrees and its elevation is 85 degrees.

The standard tower section is 35 feet high, with a 10-foot extension giving a hoisting height of 45 feet. Additional extensions are available, but the company recommends guying of the tower over 55 feet. Lifting capacity of the tower section is 6,000 pounds. Accessories include a 1½-cubic-yard concrete hopper, or a 6 x 6-foot materials platform.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 51.

### Bags for Explosives

Powder bags designed for the safe carrying of explosives are made by the American Brattice Cloth Corp., Warsaw, Ind. They are made in five sizes and capacities to fit several requirements. Special sizes and shapes can be made to order, and any model can be provided with a non-rust zipper closure. MineVent powder bags permit workmen to remove explosives from their boxes at considerable distances away from blasting operations, in order to increase safety and speed up operations at the point of blasting.

Models No. 555, 444, and 111 are the pouch type and have capacities of 20, 36, and 60 sticks, respectively. Models No. 222 and 333 are the knapsack type and have capacities of 125 and 160 sticks. These capacities are for 8 x 1½-inch sticks.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 33.

### Stock Book Lists Steels

The 1947-1948 edition of its warehouse stock book has been issued by the Crucible Steel Co. of America, 650 E. 12th St., New York 9, N. Y. The booklet describes the company's complete line of high-speed, tool, stainless, alloy, machinery, and special-purpose steels. These are made in a variety of sizes and shapes to fit many needs, and 144 pages of the catalog are devoted to listing all of these.

There are also 32 pages of tables which give engineering and design data on weights, conversions, fractions and

decimals, etc. The catalog is fully indexed, and a thumb index also marks major sections in the book.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 63.

### ASCE Picks Power as Theme For Its Meeting in Seattle

Hydroelectric power has been selected as the theme for the 1948 summer convention of the American Society of Civil Engineers, which will be held July 21 to 23 in Seattle, Wash. Engineers feel that this is an especially timely subject, with much of the nation suffering a shortage of electric power in some degree.

Technical sessions will focus on the Columbia River and its tributaries as a source of hydroelectric power. This river is one of the eight major river systems in the United States. Principal features of construction projects contemplated in the development of the river will be discussed at the meeting.

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Fairbanks-Morse Super-Spark magnetos are used year after year by the largest manufacturers of road equipment.

Hundreds of thousands of satisfied customers prefer this simple and economical magneto.

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A NAME WORTH REMEMBERING



THERE'S A

*Lightweight*

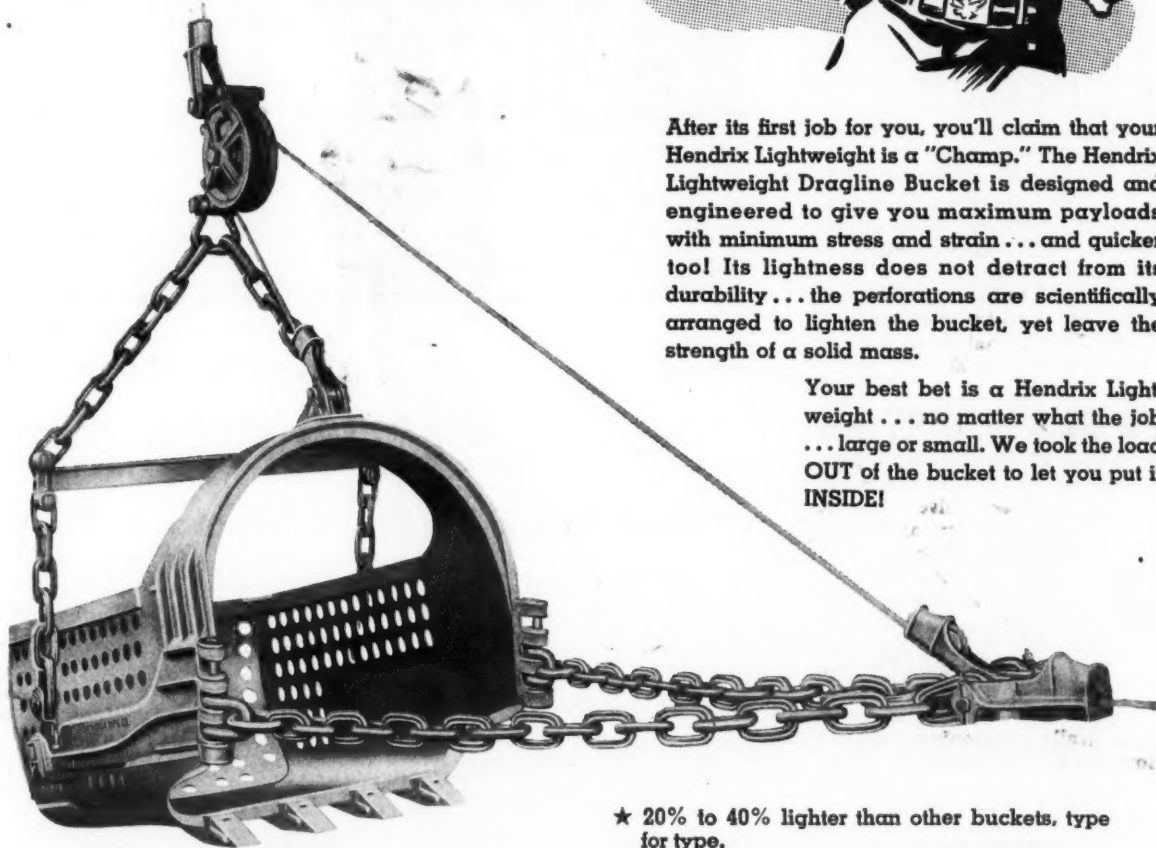
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## Citizens' Committee Sums Up Road Needs

A nine-member citizens' committee has estimated that on the basis of current road revenue it will take the State of Kentucky 27 years and nearly \$500,000,000 to bring its highway system up to standard. Commenting on the report submitted by the Citizens Committee for Long Range Highway Planning, Commissioner Garrett L. Withers said, "One . . . significant fact is plain—that without the new 2-cent added gasoline tax, very little new highway work could be done. The report is definitely conclusive that we would never have been able to meet Federal Aid without the added revenue."

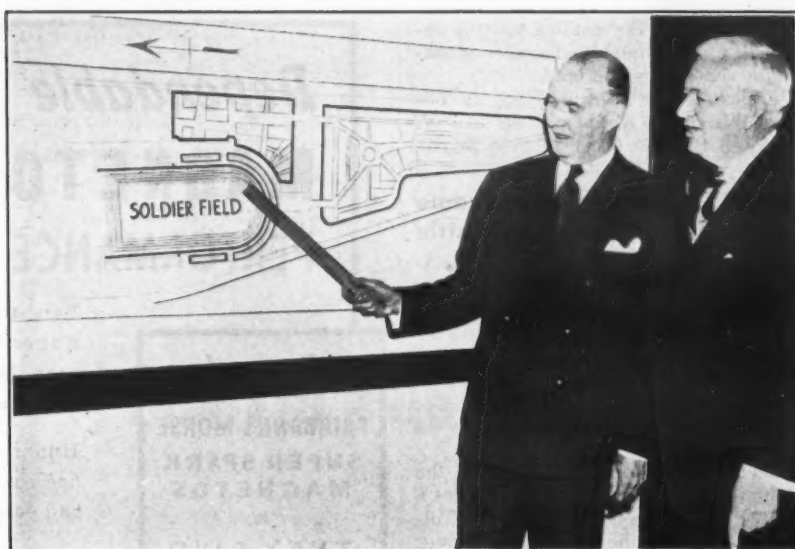
The report stated that of the 14,393 miles of state roads included in the Federal-Aid highway system, 6,372 miles are substandard; and that it would require \$366,053,000 to bring them up to standard. With the available current construction funds of about \$18,000,000, it will require 20 years to complete this system. It would require additional annual funds of \$6,000,000 to complete the system in 15 years, \$12,000,000 in 12 years, and \$19,000,000 in 10 years.

The report estimated that it would cost \$167,616,063 to correct deficiencies in the 25,845 miles of rural or third-class roads outside the Federal-Aid system. The cost of construction for all bridges on this system is estimated at \$45,389,800. At the present rate of appropriations, it would take not less than 27 years to complete the system.

Commissioner Withers pointed out that on the basis of this report it is imperative to work out a system for undertaking the most-needed projects first. He said that it is a job for which not only the Highway Department but every citizen is responsible.

The Commissioner re-appointed the full committee, adding former Highway Commissioner J. Stephen Watkins and J. Lyter Donaldson. He asked that the committee give special attention to the matter of an equitable formula to be used in the distribution of the new revenue from the increased gas tax.

The Citizens Committee was formed after a survey of the Kentucky highway system was published. This survey, made by the Public Administration Service, recommended state maintenance of all rural roads. The committee members have been selected by highway-users groups.



J. T. Callaway, left, President of the American Road Builders' Association, discusses the ground plans for the Road Show with Hon. Martin H. Kennelly, Mayor of Chicago. Over 1,250,000 square feet of display space will be utilized at Soldier Field. The 45th annual ARBA convention will also be held concurrently in Chicago July 16-24.

## Soil Mechanics Book

A book on the theory and practice of soil mechanics has been published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. "Soil Mechanics in Engineering Practice" was written by Karl Terzaghi, Professor of the Practice of Civil Engineering, Harvard University, and author of "Theoretical Soil Mechanics", and Ralph B. Peck, Research Professor of Soil Mechanics at the University of Illinois.

The book is divided into three parts. Part A deals with the physical properties of soils; Part B with theoretical soil mechanics; and Part C with problems of design and construction. Under these three classifications, Professors Terzaghi and Peck have included all the information they consider necessary for the successful application of soil mechanics to the design and construction of foundations, retaining walls, and earth structures.

The book is 566 pages long and is well illustrated. Its cost is \$5.50.



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Business leaders everywhere recognize the new high value of these latest and greatest Advance-Design trucks! You'll agree, too—once you see and once you try these trucks that represent the supreme achievement of advanced engineering. And they're the lowest-priced trucks in the volume field! Model for model, and with comparable equipment and specifications, they list for less than competitive makes—some models as much as \$150. See them at your dealer's now.

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\*Fresh air heating and ventilating system optional at extra cost.



### Dump Body Hauls Concrete

A 4-page catalog on a dump body for hauling air-entrained concrete can be secured from the Hercules Steel Products Corp., Galion, Ohio. The Hercules body has a 3-cubic-yard capacity.

It features discharge of concrete from the bottom of the load first as well as 4-point suspension and low hinging. The bottom discharge is designed to prevent premature decantation of lighter materials from the top of the load and to eliminate segregation and bleeding. Bulletin CD-1 tells how this unloading works.

Text explains the unit's various other

features designed to lower costs of operation and bring about the placing of high-quality air-entrained concrete. The final page of the folder discusses the Hercules Type 8X hydraulic hoist which lifts the body for dumping.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 91.

### Belt Conveyor in Two Sizes

A catalog describing its Model No. 24 stationary belt conveyors is available from the Atlas Conveyor Co., 1st and 15th Sts., Clintonville, Wis. These conveyors are made in 18 and 24-inch belt

sizes. Their manufacturer recommends them for use in ready-mix plants, crushing plants, and others.

A highlight of this catalog is a page showing the sectional units which make up the belt. These sections are illustrated and text is used to describe each one, its purpose, etc. The sections thus covered include the foot, intermediate, and head sections, the hopper, power drives, catwalk support, and gravity take-up.

A list of specifications includes lengths of conveyors, horsepower requirements, belt ply, belt speed, back-stop diameters, pulley and shaft diameters of the head, screw take-up travel, foot and snub data, and dimensions of

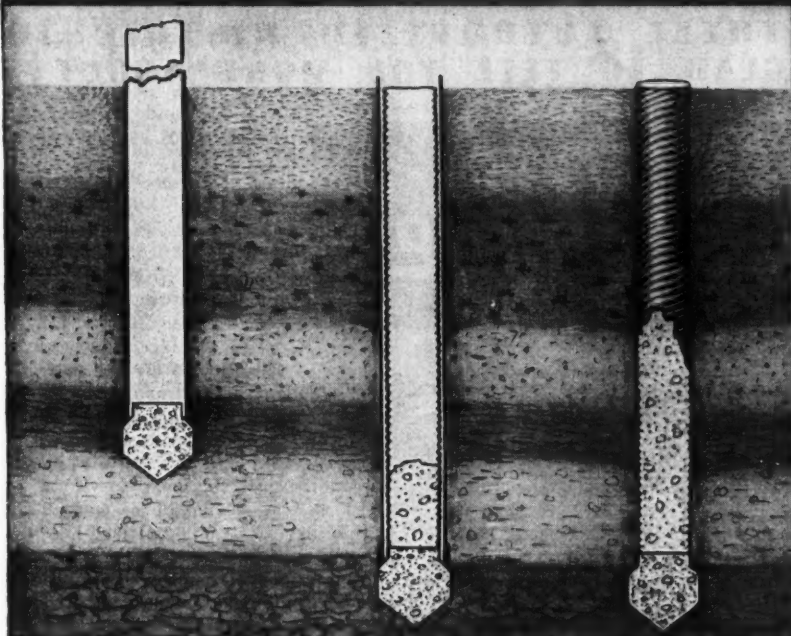
the gravity take-up—an optional feature.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 89.

### "Cat" Parts Mgrs. in East

B. J. Grimm and J. F. Hescong, Jr., have been named Parts Manager and Assistant Parts Manager, respectively, for the Eastern Division of the Caterpillar Tractor Co. Grimm succeeds E. W. Ryder, who resigned to become General Parts and Service Manager for the Cleveland Bros. Equipment Co., Inc., of Harrisburg and Luzerne, Pa.

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When a firm bearing stratum must be reached, Button Bottom Piles\* often provide the surest, easiest, and most economical solution.

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*Precast Button Bottom, followed by steel casing, is driven into bearing stratum, forming a bulb of pressure.*

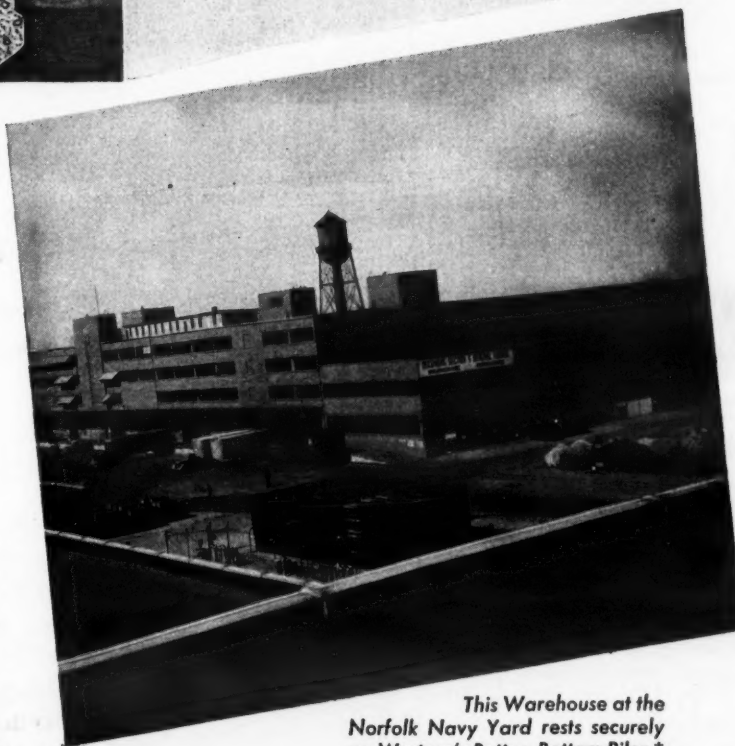
*Corrugated steel shell is then lowered undamaged inside protective driving casing, and locked onto Button Bottom. Shell is filled with concrete and casing withdrawn, allowing compressed soil to expand and grip pile shaft.*

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**YOUR JOB:** Although WESTERN usually employs one or more of its six exclusive types of foundations, brand-new variants will be created where necessary to solve your particular job. WESTERN has never had a failure! If you have a foundation problem, make use of our **FREE CONSULTATION SERVICE** . . . no obligation.

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*This Warehouse at the Norfolk Navy Yard rests securely on Western's Button Bottom Piles.\**

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# Hydraulic Sluicing Handles Unusual Job

**Sensibar Method Brings Pumps, Venturi Eductors, And Monitors to Bear on 14,000,000-Yard Project**

(Photos on pages 64 and 65)

ON the biggest scale ever attempted in southern California, the patented Sensibar method of sand removal is changing the face of the earth near El Segundo. A 14,000,000-yard sand dune is disappearing.

Men with hydraulic monitors are sluicing the sand to educators designed on the principle of the Venturi tube. Other men control the sand-water mix at a surge pit and mixing chamber. Big 28-inch centrifugal sand pumps of the type commonly used in hydraulic dredging then pick the material up and expend 16,000 hp to move it through a booster station to the point of disposal, a maximum distance of 30,000 feet. Four of these big pumps, each using 4,000-hp motors, drive the mixture at a velocity of 18 to 22 feet per second to the dump.

Peter Kiewit Sons Co. of Omaha, and Construction Aggregates Corp. of Chicago, on a joint venture, were awarded the job by the Los Angeles City Department of Public Works on their low bid of \$3,494,088. Their contract includes, in addition to the very interesting sand-moving job, the demolition of the old outfall sewer of 1917, demolition of the Central Outfall and its relocation through the project site, the removal of some buildings, and some paving.

Let on July 15, 1946, the big job required extensive investments in time and initial preparation, but by March of 1947 the first sand was moved. The job has a scheduled completion date of January 1, 1949, but operations are proceeding at a pace expected to beat that deadline.

## Marks First Work on Sewer

Actually, this sand-removal project is the first part of the construction of a new high-rate activated sludge plant, capable of handling a peak load of 420 mgd. This project, together with the new submarine outfall currently under

construction by Guy F. Atkinson Co. (see C. & E. M., Oct., 1947, pg. 34, and Feb., 1948, pg. 1) will open the way for construction of a headworks building with sedimentation tanks, a power plant, aerators, warehouse and shop building, digesters, an elutriation building, a filter and drier building, and fertilizer storage.

As a secondary part of the contract, the disposal of all this sand along the shore line will widen the beach to an average of 600 feet for a distance of 6 miles along the ocean from El Segundo to Santa Monica. For years this has been a goal of men in the office of Lloyd Aldrich, Los Angeles City Engineer. Ultimately the development of the shore line for recreation will result in a 50,000,000-yard fill from 750 to 1,250



Gerald W. Anderson Photo

The long-barreled cannon-shaped monitors used on the El Segundo hydraulic sluicing job were built by Joshua Hendy Iron Works of Sunnyvale, California. They deliver a tremendous volume of water in a 300-foot circle, and sand dunes fairly explode under the pressure.

feet wide along 13 miles of beach. This will be improved with a double-lane scenic drive, auto parking for 40,000 cars, recreation and park areas, a 50-foot boardwalk, and a sand beach 250 feet wide along the entire improvement.

The present work marks the first disposal of material in the ultimate project. A 9,000-craft yacht harbor will also be constructed landward of the beach at Playa del Rey.

(Continued on next page)

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The proof of any paving equipment is in its performance. Moto-Paver, the complete traveling mixer and paver, has now been on the job for more than a year. The quality—and the cost—of the work it has done will make interesting reading for any paving contractor, highway official or engineer. A performance record, with typical cost table, will be sent on request. Address the factory, or see your nearest distributor listed below:

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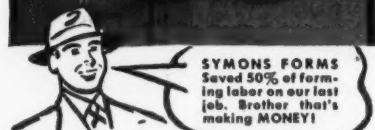
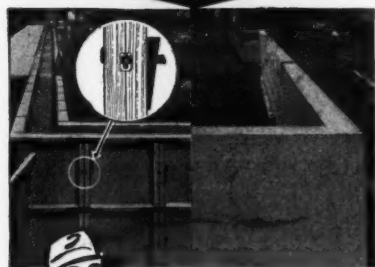
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### Hydraulic Application Is Big

The use of hydraulic sluicing on such a big scale is new to southern California. However similar work has been done on a smaller scale for years in the northern part of the state, in connection with placer mining. So the fundamentals of the method were fairly well established when the job was bid.

Basically, the work at El Segundo consists of four major parts, so far as the sand removal is concerned. There is the excavation area from which the sand is sluiced; a surge pit with a mixing chamber to keep the material moving; a main pumping station to start the mixture out towards the shore line to build the first 11,000 feet of beach; and finally a booster station to complete the remainder of the beach fill.

Details of these operations follow.

#### Initial Preparation

Months before sand began to move, men and equipment were busy making the necessary extensive preparations. A subcontract was let to Macco Corp. to drive the sheet pile cofferdams which enclose the surge pit and the grounds of the main pumping plant. Other pile driving was also necessary in connection with the pipe-line trestles at the surge pit, and a trestle across Ballona Creek near Venice.

About 40,000 linear feet of 28-inch steel discharge pipe was fabricated by Pacific Coast Engineering Co. of Alameda, and equipped with Naylor-type ends. This discharge pipe was made up in 48-foot lengths, with 1/2 and 3/8-inch steel walls. About 17,000 feet of Naylor pipe in sizes of 20 to 29-inch-diameter is also used on the project.

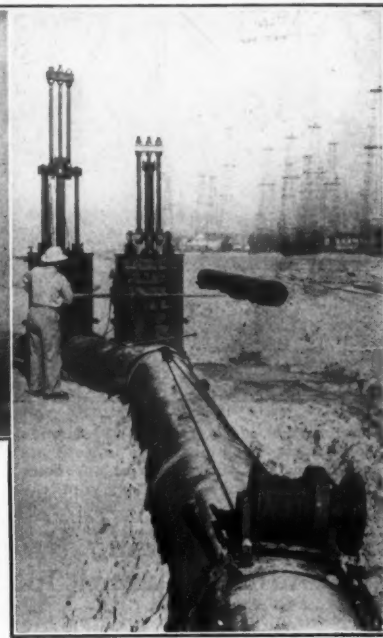
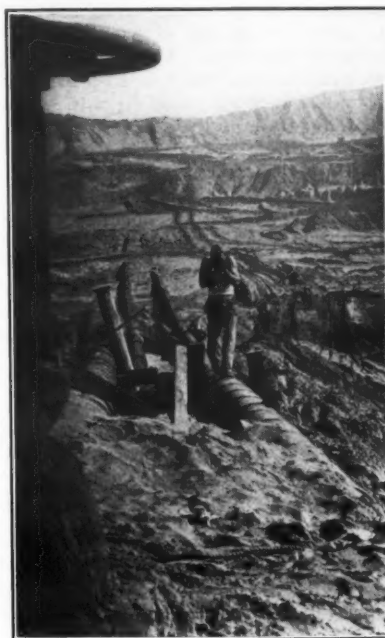
In the meantime, the prime contractor's men were also busy installing the main pump station, the booster plant, and the surge pit. It is impossible to determine exactly the outlay of investment in equipment and payrolls before the first pay yard of sand was moved, but it was sizable, to say the least.

Another subcontract, on which work started soon after the pumping commenced, was the demolition of the old 5-foot-diameter vitrified-brick and concrete Central Outfall sewer built in 1917. This work, with the demolition and disposal of several adobe buildings of the antiquated sewage-screening plant, was let to Emsco Concrete Cutting Corp. of Los Angeles. Emsco used a rented Bucyrus-Erie 22-B crane with a 4,000-pound skull-cracker, and a 3/4-cubic-yard McCaffrey clamshell bucket to load to three 5-yard dump trucks which disposed of the broken material. Specifications called for everything 4 inches in size and larger to be hauled to disposal dumps about 3 miles away.

The first sluicing work was ready to begin on March 7, 1947. And that first day's work has been improved on enormously since then, with variations and refinements of the Sensibar method.

#### Monitors Sluice the Sand

Monitors furnish the initial force  
(Continued on next page)



C. & E. M. Photos

The pipe lines (left) carry water under high pressure from the main pump station to the monitors (above) which are sluicing sand from the dunes near El Segundo, Calif. At right Virgil Zugg, Dump Foreman, makes a line switch at a pipe wye by pumping the hydraulic mechanism which moves the gate valves. In the foreground is an old-type Beebe winch which helps make up the joint.



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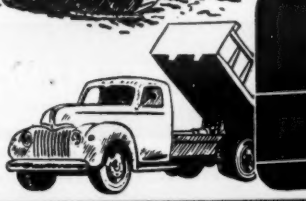
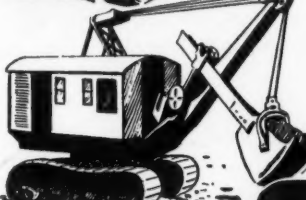
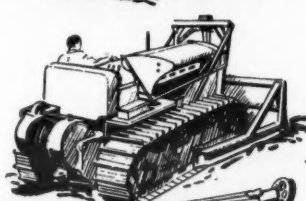
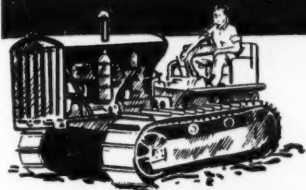
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From All Types of Construction Equipment



**8 to 10 times Faster . . . than you can clean by hand**  
**SAVES TIME . . . LABOR . . . EXPENSE**



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Gerald W. Anderson Photo

Preliminary work on the El Segundo job included driving this sheet pile cofferdam at the grounds of the main pumping plant. Macco Corp. did the work under a subcontract.

## Hydraulic Sluicing Handles Unusual Job

(Continued from preceding page)

which cuts sand loose from the dunes and starts it on the way towards the beach. These long-barreled cannon-shaped contrivances were built by Joshua Hendy Iron Works of Sunnyvale, and are affectionately called "the giants" by the men who operate them.

The monitors have 3½ to 5-inch-diameter nozzles at the ends of their 15-foot barrels, are swivel-mounted, and have a weighted-arm counterbalance at the rear end. At the working pressures at which they operate, they deliver a tremendous volume of water in a circle of up to 300 feet. The destructive force of this water wall is enormous. Sand banks fairly explode with a great roar when a monitor begins work at point-blank range.

The monitors are hooked directly to pipe lines 28 to 36 inches in diameter, which supply them with water under high pressure from the pumps in the main pump station.

After all these months, the men who work day after day with water under pressure have become wise indeed in the laws of nature. For nature plays just as big a part here as any rule of mechanical engineering.

For example, the monitors have to be set up to operate a cut efficiently, at high output, and to the best advantage. Yet should a change of wind blow excessive salt spray back in the faces of the monitor operators, they must be able to swivel the stream around and bring it to play on some other location, perhaps on clean-up work. For while the men work with rubber rain suits, a head-on wind can be unbearable. It can also reduce the efficiency of the water stream by shearing off a fair percentage in the form of spray.

So much depends on erosion by gravity, after the sand is cut loose, that the biggest possible stream at the highest possible velocity is the one which pays off in yardage. Often the monitor stream will play for an hour or more

on one spot at the base of a high sand bank, caving and washing prodigious chunks of material away. The same water, if played around like a garden hose, would drop its solid content and effective force in a few feet. The relationship between high output and the concentrated use of water at the monitors cannot be stressed too highly, according to the men doing the work.

### Eductors Pick Up Solution

As the monitors cut sand out of the dunes, the sand forms in solution with the discharged water and runs in a stream down a varying slope towards catch basins which pick up the material. The ingenious use of the Venturi-tube principle here has resulted in a catch basin which develops high suction vacuum. Naturally, this results in much more efficient pick-up of the sand load.

These suction intakes consist of a steel framework about 3 feet square, centered around the end of the tube. Each tube is choked down to a much smaller diameter throat in the center,

and has a large nozzle which supplies a high-velocity jet of water to the center of the tube. Water under high pressure reaches these nozzles through 20 and 22-inch pipe lines from the main pumping station.

When this jet of water discharges at high speed through the throat of the tube, it creates a partial vacuum out at the intake. Although eductor lines over 2,000 feet long from pick-up point to surge pit are used, no line has ever plugged up to a point where the eductor action will not open it in a few minutes.

When the eductors were first installed, however, the abrasion of high-velocity sand wore out the tube throats after only 70,000 cubic yards had gone through. The constant replacement of eductor tubes became a problem, but not for long. Tubes manufactured with special-alloy metal were substituted and are now lasting many times longer than those originally installed.

Above each eductor tube has been placed a steel brace-work several feet high. This gives a man something safe

to cling to while he pulls trash away; it furnishes a fast rule-of-thumb elevation reference, since the eductor intake is seldom in sight; and it is handy to hook on to when a crane moves the eductors to another location.

The eductor lines are generally laid on a down grade towards the surge pit. "If we get hoggish and try to flatten 'em out too much, we lose production every time", one of the excavation bosses explained. These lines are so efficient, when properly fed, that they develop considerable pressure before discharging to the pool at the surge pit, and have been known to develop up to 80-psi pressure with the pipe line temporarily blocked.

### Surge Pit Receives Sand

Sand and water from the eductor lines come in over trestlework at rim elevation of the surge pit, with some straight gravity flume lines discharging at lower elevations. The solution flows into a big rectangular surge pit about

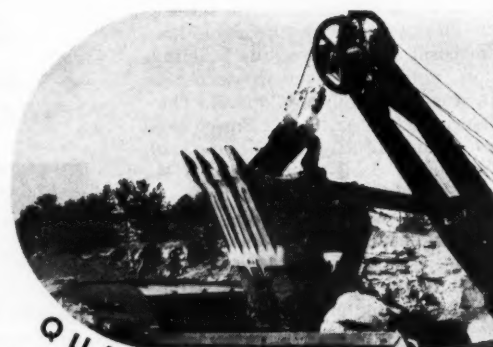
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A swingin' and a diggin'—with the aid of a 3-ton skull cracker, the Amsco All-Manganese-Steel Welded Type Dipper above is shown helping to demolish and clear 18 square blocks of Manhattan's lower East Side. Out of this seeming destruction will rise housing accommodations to give the families of 8,761 veterans a toe-hold on the future.

Wherever better living is being provided for tomorrow . . . building sites, highways, mines, dams, quarries . . . there you will find Amsco dippers digging, filling, transferring and loading. They keep every type of project moving at top speed because they give extra service day after day without repair and maintenance delays.

Amsco All-Manganese-Steel Welded Type Dippers, also shown here on a quarry operation, feature plug-welded, overlapping castings for maximum strength with minimum weight. Amsco All-Manganese-Steel Renewable Lip Dippers, shown here on a coal stripping operation, have extra ruggedness throughout plus a quickly removable and replaceable lip for high speed repair. Correct design assures fast, full loading; with minimum "crowd" and quick, complete dumping. Use of "the toughest steel known" throughout adds efficiency and multiplies service life. While the body metal stays tough, the surface work-hardens and polishes under impacts to as high as 550 Brinell to fight abrasion and improve penetration and dumping. Send for Bulletin 547-DS.



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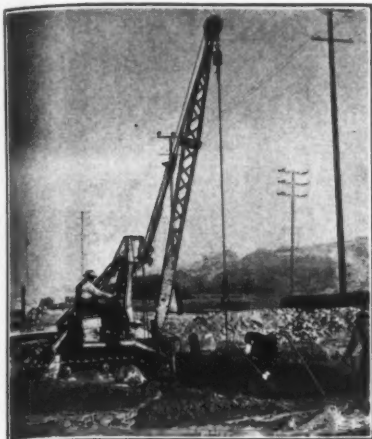
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Offices in principal cities. In Canada: Joliette Steel Limited, Joliette, Que.





C. &amp; E. M. Photo

A Caterpillar-mounted Hyster rear winch makes the lift to roll pipe line 180 degrees. These pipe lines on the El Segundo job have to be turned over after about four months, to make them wear evenly all around.

200 x 300 feet, where approximately 6,000 cubic yards of sand can be stored on each side of a mixing chamber.

This mixing chamber, or well, is a steel box 10 x 12 feet and 30 feet high. On its north and south sides it has six gated openings, three of which admit sand and three which admit water. By regulating the inflow of sand with the proper water supply, the operator skillfully sends the optimum load of pay dirt towards the pumping station. He takes any inequalities out of material coming in from the eductors.

Elevation of the mixing-well foundation is 2 feet above sea level. The flow line of the suction pipe to the pump house is at elevation 4. The lower gates are at elevation 9. The gates, actuated by hydraulic rams, are easily and rapidly controlled by the plant operator. Quick-acting valves on a water line near-by give the operator an auxiliary source of high-pressure water to clear the mixing well in a hurry.

The wood-pile trestles, which extend over 120 feet north and south from the mixing well, afford access to all parts of the incoming pipe lines, and auxiliary monitors mounted above the ends of the surge pit can clear it of sand in a few hours.

A trash rack, with grizzly bars close together, prevents big pieces of wood or trash from entering the well. The plant operator's helper is usually busy with a long-handled pike pole, pushing trash aside or fishing it out.

#### Sand Goes to Dredge Pumps

A 150-foot intake pipe line, 30 inches in diameter, connects the mixing well to the main pumping station. Here in the pump station are the huge 28-inch centrifugal dredge pumps which give the material its first shove towards the disposal area.

The primary sand pump in the station is a 28-inch Meckum vertical-discharge centrifugal type, powered by a 4,000-hp General Electric motor. A second 28-inch Meckum dredge pump acts as a booster for this hook-up. Another battery of two pumps consists of two 28-inch machines, one Bucyrus-Erie and one Meckum, each powered by G-E 4,000-hp motors. Electric power for these big induction motors comes in at 24,500 volts from the Los Angeles Department of Water and Power transmission lines, is stepped down to 4,800 volts at a transformer station, and used at that voltage on the motors. All pumps are operated with 88-inch runners, hard-faced. The pump shells contain special-alloy liners 3½ inches thick, which have performed creditably.

The pumps normally operate at 253 rpm at full load, and two pumps in series develop about 170 pounds of pressure at the discharge throat. Other pumps at this main station include a 36-inch vertical-discharge pump without liners and a 36-inch Meckum horizontal-discharge centrifugal pump, both of which are used to pump water

to the monitors, eductor nozzles, and various other auxiliary water lines.

Working 6 days a week, 24 hours a day, the pumps and motors take such a severe beating that each Sunday is set aside for repairs. There is always a great deal of cleaning to be done on the big motors, and any time a pump shuts down it takes some welding. Spare impellers are constantly in the process of being hard-faced in the yard outside the station.

At the booster station, the pipe line is so hooked up that either pump or both pumps can be used. Two 28-inch pumps do duty there, and eventually will have to move the material nearly 19,000 feet farther on to the end of the fill. Both these pumps are driven by 4,000-hp G-E motors.

#### Pipe Lines and Disposal Dump

The long pipe line from the pump station to the fill is made up of 48-foot sections. These pieces are hauled over the sand by a Caterpillar-drawn Athey

(Concluded on next page)



ASPHALT CUTTERS

MOIL POINTS

GADS

DIGGING CHISELS

### Dallett's Contractor Tools

The utmost service can always be expected of Dallett Contractor Tools. They are made by Master Craftsmen of forged products, using the highest possible standards for quality.

Write for Bulletin C-220

TOOL MAKERS

SINCE 1883

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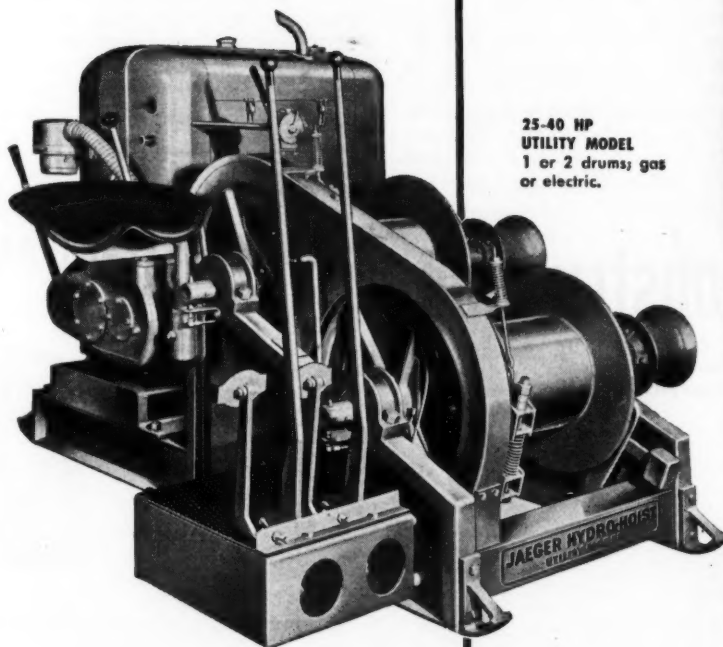
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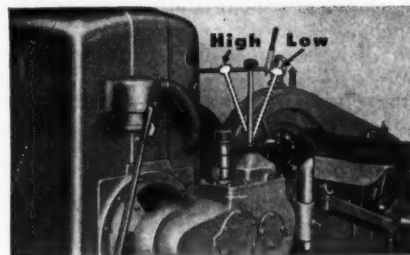
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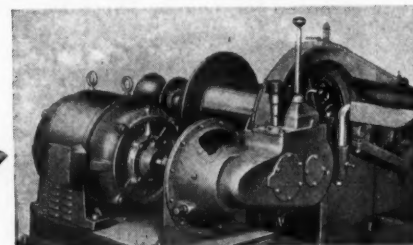
# JAEGER TWO SPEED HYDRO-HOIST



25-40 HP  
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1 or 2 drums; gas  
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INSTANT LEVER SHIFT to powerful "low gear" or fast "high gear"—in the same hoist. Handles a wider range of work; speeds your lighter loads.



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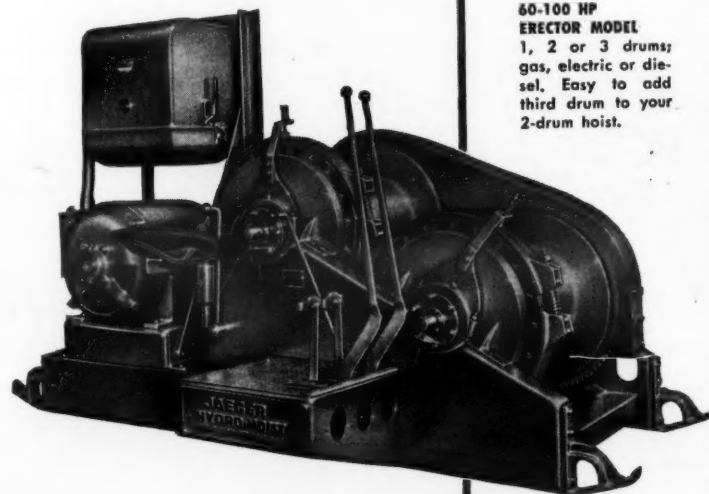
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TIMKEN BEARINGS in all "Erectors" models; all shaft bearings in self-aligning bearing blocks.

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ERECTOR MODEL  
1, 2 or 3 drums;  
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## Hydraulic Sluicing Handles Unusual Job

(Continued from preceding page)

Forged-Trak trailer, and the job has a Caterpillar-mounted Hyster rear winch and boom to handle piping and valves.

The stub lines which build the fill seaward from wyes in the line are made up of shorter pieces. They are easier to handle and haul.

Strangely enough, the most destructive action on the pipe line is chemical. Pits, scars, and gores have appeared in the top quadrant inside of some of the pipes after a few months. This destruction seems to be caused by some chemical reaction. It reduces the wall thickness of pipe in a shorter period of time than does the abrasive action of the sand solution. When the pipe line is turned 180 degrees after about 4,000,000 cubic yards, the men have the chemical condition in mind perhaps more than abrasion. It is believed now that this problem has been solved.

The wyes on the pipe line have gate valves which no longer require Herculean effort on the part of men who have to open and close them. For the new valves are moved up and down by hydraulic cylinders, which can deliver 30 tons of up or down pressure. Thrust forces at the wye, and also at the end of the pipe line, are restrained by small but powerful Beebe winches, hand-operated, which also come in handy for making up the joint at these places.

The fill is being pushed ahead first by a pilot deposit near the beach line. Filling the sand in at this point to elevation 12 prevents any backwash or lagooning effect. Wyes are installed in the line, and about every 250 feet a stub line carries the fill seaward to the outer limits of the dump.

One of the most effective tools on the fill is a spoon section at the discharge end of the pipe line. Virgil Zugg, Dump



Above, mechanics on the Peter Kiewit-Construction Aggregates Corp. job make some repairs in the yard of the main pump station. At right, a mechanic, wearing goggles, dresses pump bolts on a bench grinder.



Foreman, claims he developed this design some years back on a job for the Case Dredging Co. The spoon spreads the sand out evenly with a minimum of erosion, and dissipates the force of the water.

The spoon is about 6 feet long, made from dredge pipe. Two elevating baffles about one-fourth the pipe diameter, and an elevating lip at the end, raise the solution and fan it out. Openings 12 inches square in the bottom of the spoon, just ahead of these baffles, permit solids to drop through. Four large openings along the sides also permit sand to escape. The spoon is specially designed to spread sand from the bottom, and to permit water to escape at reduced force through the top.

Discharge pressures at the main pump station vary from 160 to 170 psi, and pipe-line velocities range from 18 to 22 fps. Zugg has two helpers at the dump ground, plus whatever equipment operators are needed to run the tractors. The dump is purely a pipe-line fill, which will be acted upon by wind

and high surf, but it is remarkably level.

Completion of the job will open up, for construction of the sewage-treatment plant, an entire new area from Imperial Boulevard to Grand Boulevard at El Segundo, where once stood the giant sand dunes now being washed away. And when the big sewage plant is finally erected—to be one of the largest in the world—it will mark the end of years of litigation and strife. Too, it will mean an end to the beach quarantine along miles of ocean at this point, for the effluent which will pass through the submarine outfall will be clear and pure.

### Personnel

The ingenious layout and design for the performance of this work, involving the use of the patented Sensibar method, was made by Roy A. Brinkman and Golbert Rocke under the supervision

of J. R. Sensibar. Jean M. Allen, Kellogg Smith, and Roy Freeman are consulting engineers.

The big project is being administered under supervision of Thomas H. Paul, Vice President and District Manager of the Peter Kiewit organization at Arcadia, Calif., and Roy A. Brinkman, Vice President of Construction Aggregates Corp. of Chicago, with A. E. Randall as Project Manager.

Other field personnel include Charles J. Poppe, Project Engineer; Gareld W. Anderson, Mechanical Superintendent; W. J. Aiken, Excavation Superintendent; L. P. Berzina and Virgil Zugg, Dump Foremen. James Faulkner, Coordinating Engineer, and C. E. Trotter, Resident Engineer, represent the City of Los Angeles.

The job was designed and is being administered through the office of Lloyd Aldrich, City Engineer of Los Angeles.

## New...built for Construction

An Exclusive combination of Benefits are now  
Created for You by These New Heavy-Duty Jacks!



Check these cost-cutting features of the new 30-ton FB-11 and the 50-ton GB-11. They bring you outstanding new jack performance never before known in construction and maintenance work. (Other Blackhawk models include 3, 5, 8, 12, and 20-ton sizes.) See your Blackhawk Industrial Supply Distributor for full information on these new Jacks.

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HYDRAULIC JACKS

- **PATENTED DOUBLE PUMP**—all in ONE unit! Speed pump provides fast load-contact—powerful load pump cuts in automatically! No shifting handle or double-yoking as with separate pumps.

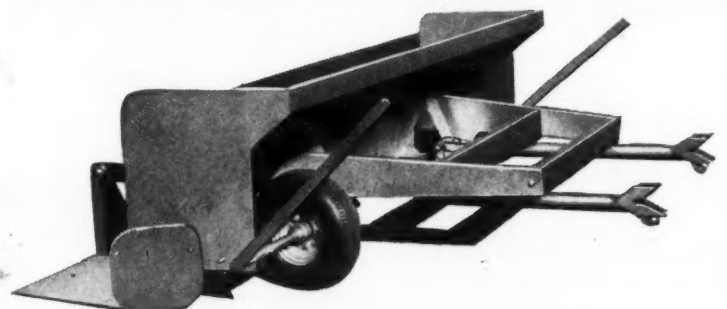
- **ALL-DIRECTIONAL OPERATION**—Full power and travel at any angle, vertical to horizontal. Handle forms positive side-rest for horizontal use.

- **GAUGE EQUIPPED**—Base is tapped for hook-up of gauge to show amount of pressure exerted—for measuring or testing applications.

- **PUMP BEAM PROTECTION** is provided by handle and base. Pump is concealed. Beam is protectively enclosed at entry point to base.

- **SUPER STRONG BASE**—machined from single piece of non-porous steel. Release valve is recessed to prevent accidental lowering and breakage.

## The New MILLER BITUMINOUS CONCRETE and AGGREGATE SPREADER



Spreads a level course regardless of base contour

Speeds up your laying jobs—Cuts hand labor costs 90%

Spreads from 1/2" to 8" thickness—Maximum capacity one ton per minute

Sturdily built—of all-steel, welded construction

Available in two widths—7' 6" and 8' (Other widths made up on special order)



The Miller Spreader in operation, showing a depression filled and leveled, leaving a smooth surface for rolling.

The Miller Spreader is especially adaptable for building driveways, gas stations, parking lots, sidewalks, and industrial flooring. It spreads—easily and quickly—limestone, slag, gravel, cinders, or any other material used in highway or driveway construction.

Write today for a free copy of the new Miller Spreader Folder.

## THE MILLER SPREADER CORPORATION

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Youngstown 2, Ohio



Its vertical 3-position-boom design enables the new Barber-Greene Model 720 ditcher to stay close to the digging line. It can handle trenches 8 to 11 inches wide and up to 4 feet deep.

### Trenching Machine Has 3-Position Boom

Two new ditching machines have been put into production by the Barber-Greene Co., Aurora, Ill. They feature an adjustable 3-position boom, and digging speeds of up to 32 feet per minute. The Model No. 720 is designed to dig trenches from 8 to 11 inches wide, and up to 4 feet deep. The Model No. 710 is designed to dig trenches up to 5½ inches wide, and up to 3½ feet deep.

Close adherence to the digging line is possible with the No. 720 trencher, explains the manufacturer, thanks to its vertical-boom design and the new 3-position feature. The vertical boom digs straight down, the company explains, and leaves no ramp. The spoils conveyor is adjustable to either side. Travel speed is listed as up to 234 feet per minute.

The B-G Model No. 710 is recommended by Barber-Greene for general utility use. It is built with the same features as the Model No. 720. Both machines are also equipped with a patented Overland Release to prevent damage from heavy boulders, etc. Booms have hydraulic hoists for power lift and controlled gravity lowering. A special cable-laying attachment is available for use with the Model 710; it is designed to feed cable and plow over the spoil in one continuous pass.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 18.

### New Nickel-Core Rod Uses Low Amperages

An electrode for producing machinable welds in the 45 to 140-amp range has been announced by the All-State Welding Alloys Co., Inc., 96 West Post Road, White Plains, N. Y. It has a nickel core and is recommended by the manufacturer for use on cast iron wherever machinability and color match are required.

The All-State No. 4 electrode is said to feature freedom from spatter and a good affinity for the parent metal on castings. All-State recommends it especially for the repair of cylinder heads and engine blocks, because of the low amperage required and the ductility of the weld it produces. It can be used on either ac or dc, and is obtainable in diameters of 3/32, 1/8, and 5/32 inch.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 35.

### Pumps for Contractors' Use In Many Styles and Types

A catalog covering its complete line of post-war pumps has been put out by the Ralph B. Carter Co., Hackensack, N. J. This line includes self-priming centrifugal pumps in capacities from 4,500 to 200,000 gph, single-diaphragm, double-diaphragm, vertical-caisson, jetting, plunger-pressure, and electric-driven pumps.

The catalog consists of a series of separate data sheets inserted into a special folder. These sheets are thumb-indexed, so that a short description of each is available at a glance. The data sheets provide information on capacities, dimensions and weights, and other specifications. Each model is illustrated,

and its outstanding advantages and features are described. Catalog No. 4503 contains sixteen of these sheets.

Also featured in the catalog is a series of Humdinger operating hints designed to help the user obtain the service built into the pumps. There is a section devoted to general information on suction lift, atmospheric pressure, inches of vacuum, pressure required to raise water, determination of horsepower, etc. Other engineering data cover conversion factors, weight and volume equivalents, and the friction of water in pipes of various sizes.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 86.

### Nordberg Shifts Engineer

Harold N. Propp, Sales Engineer of the Nordberg Mfg. Co., Milwaukee, Wis., has been transferred to the San Francisco district office. Mr. Propp is connected with the Crusher and Process Machinery Divisions.

## HOT or COLD Mix Asphalt

DUST  
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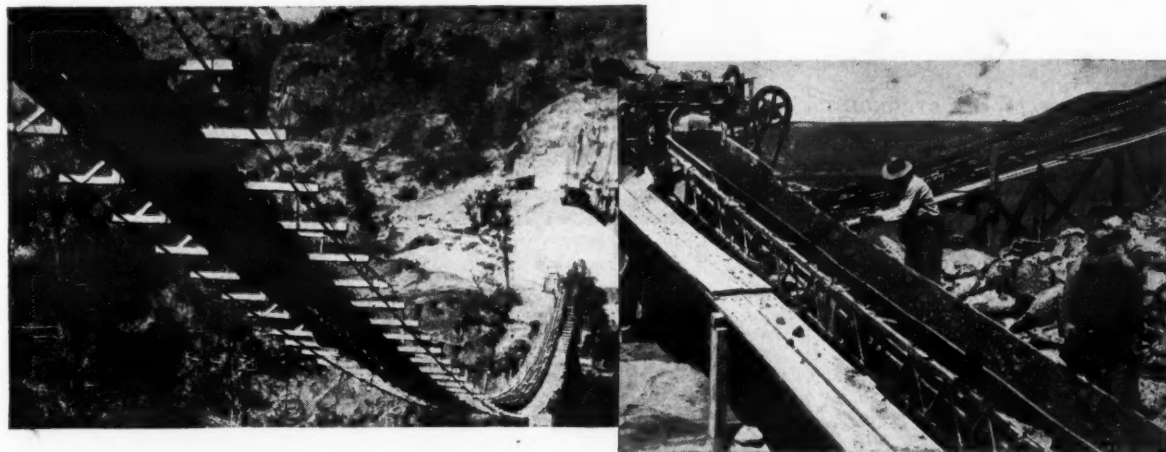


FEEDERS  
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STRANGE! Construction men have their likes and dislikes about equipment for certain jobs and back their ideas with arguments, orders, and specifications. But when buying hose or belt, they will accept whatever is available.

Do they think that "All Rubber Goods Are Alike?" "TAIN'T SO, MISTER." Constructions and Compounds in Rubber Products can vary just as much as design in machinery; however, the difference is not visible.

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U. S. Rubber's experience in building conveyor belts for carrying materials on construction jobs extends from the smallest roadside portable crushers to the largest dirt and rock moving projects.

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# County Digs Ditches To Drain Farm Lands

## All of Its 301-Mile Road System Is Surfaced; New Wing on Shop Plays Part In Equipment Maintenance

DELAWARE County in central Ohio contains 447.5 square miles of flat or slightly rolling land devoted mainly to dairying or to agriculture. Through the county from north to south run three good-sized rivers—the Scioto, Olentangy, and Big Walnut. Keeping these farm lands properly drained is a function of the County Highway Department, even though the ditches it digs for this purpose may have no direct relation to the county road system. This system, incidentally, boasts of not a single dirt road on its 301-mile network. Most of the roads—a flat 200 miles—have been bituminous surface-treated, while the remaining 101 miles are traffic-bound macadam.

The county seat is in Delaware, a city of 8,000 population located a little northwest of the geographical center of the county. Here some small factories contribute to the industrial picture of the county. Educationally, the city is known for Ohio Wesleyan College which is located there. Outside the city, the county has a population of 18,000 scattered over the 18 townships.

A three-man board of County Commissioners directs the activities of the Highway Department which is supervised by a County Engineer. All four are elective officers, the term being four years with the elections held biannually. At one election the County Engineer and one of the Commissioners are chosen. Two years later the voters select the two other Commissioners. Lot D. Jones, the present County Engineer, was elected in 1946.

### County Drainage

One of the big problems confronting the County during the past year was the maintenance of drainage ditches which cut across the farms carrying surface or storm water to the creeks or rivers. Heavy rains in Ohio during the spring and summer of 1947 caused these ditches to silt up from heavy run-offs.

To restore their drainage efficiency and water-carrying capacity, they had to be cleaned out. Practically all of this work is done by contract, since it is primarily an equipment job. The ditches measure 8 feet across at the bottom. Side slopes are usually 1½ to 1, with variable depth. Two of the major contracts completed were for the cleaning out of ditches 7,500 and 2,500 feet long.

The work originates when a group of farmers, whose property is affected when the ditches fail to drain their land, petitions the County to clean out the filled-in ditch line. The County makes a survey which determines the amount of excavation involved, and calls for bids on the work. Contractors use either a dragline or backhoe, as a rule, in opening up the ditches.



C. & E. M. Photo

This modern wing was recently added to the Delaware County shop and garage to house important maintenance and repair facilities.

The cost of the work is pro-rated among the farmers concerned on the basis of the acreage they own which drains in to this particular ditch. The assessment is paid off over a five-year

period semi-annually as taxes.

### Road System

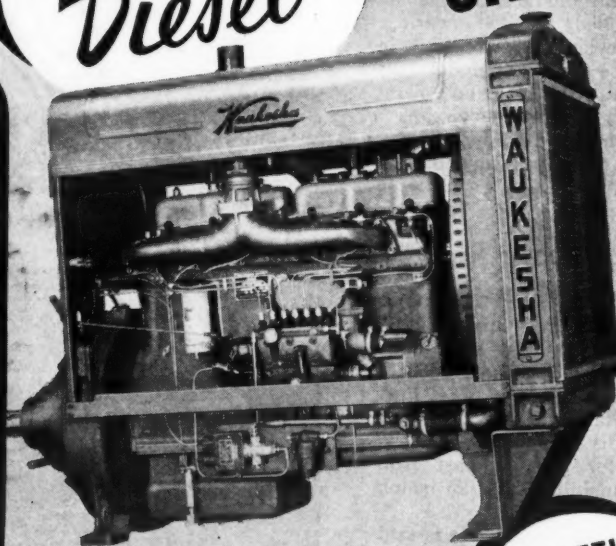
In addition to the 301 miles of county (Continued on next page)

# WAUKESHA

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Diesel

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BULLETIN  
NO. 1414

This packaged power plant is a basically postwar Diesel. It has all the tested and proved features of the most reliable wartime engines. In addition it has special Diesel design characteristics—research-results of Waukesha's forty years know-how in internal combustion engine building. Most unique of all these advanced Diesel features is its Waukesha-patented combustion chamber. It burns all standard "high speed Diesel fuels" 45 cetane or above. Fuel burning is orderly, clean and complete. Fuel economy is high. Engine runs smoothly, without shudder and vibration. Maintenance is simpler and costs less. Acceleration is lively and responsive. Operating on the four-cycle principle this Diesel is as easily understood as the typical automobile engine. And easily serviced. Six cylinders, 5¼ in. bore x 6 in. stroke, 779 cu. in. displ. Get the whole story. Send for Bulletin 1414.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS., NEW YORK, TULSA, LOS ANGELES



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Now available in 2, 5 and 15-ton Sizes.  
For capacity comparison, ½" cable used:

2-TON "Lightweight"	75 ft.
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With patent gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price
2-Ton 4 & 22 to 1	60 lb.	\$70.00
5-Ton 4 & 24 to 1	110 lb.	\$90.00
15-Ton 4, 19 & 109 to 1	680 lb.	\$350.00

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roads within the borders of Delaware County, there are also 178 miles of state roads and 390 miles of township roads. The state roads, of course, are all high-type pavements, while the township roads are mostly dirt with only a few miles surface-treated. As previously mentioned, two-thirds of the county roads have some kind of black-top pavement that has been bituminous surface-treated, while the remaining third is traffic-bound macadam. Their widths range from 14 to 16 feet.

Last year most of the road work was simply maintenance, but 7 miles of stone macadam was surface-treated, and another 2½-mile section of the Old State Road in Berlin Township was resurfaced with Federal Aid.

The traffic-bound macadam roads are built up over the years by adding stone from the tail-gates of trucks, whenever necessary, and spreading the material evenly over the road with motor graders. Four limestone commercial quarries in the cavern area south of Delaware supply the county with the required stone.

To improve one of these traffic-bound macadam roads the County uses its own forces to spread a 3-inch course of crushed stone over the top of the old road, with the material graded from 1½ inch down to fines. The stone is dumped via tail-gates, spread by motor graders, and rolled by a 10-ton 3-wheel roller. After being compacted under traffic for a year, the surface is given a penetration shot of MC-2 asphalt, followed by a double bituminous surface treatment with MC-5 asphalt and stone chips. The total amount of bitumen in the three applications averages one gallon.

Last year the funds available for county road work totaled \$190,000. This revenue was made possible through the gasoline tax and auto license fees.

#### Maintenance Shop and Garage

The Delaware County maintenance shop and garage occupies a triangular plot of ground in the northeast section of the city of Delaware. It is bordered by Flax Street, Lake Street, and Parsons Avenue, and close by the tracks of the C. C. C. & St. Louis Railroad. On this site, which measures 305 x 178 feet along the greatest dimensions, is centered the 130 x 55-foot county maintenance building. This one-story brick structure with a concrete floor was once an old flax mill whose hand-hewed oak beams still support the peaked composition roof. The interior is now mainly used for equipment storage and is entered through 12-foot-wide sliding doors in the north and east walls.

One partitioned-off portion of the old mill is used for an office by the garage foreman. Two other 20 x 20-foot enclosures are a stock room and blacksmith shop. The latter contains a 4-foot square brick forge, a 250-pound anvil, a 6-inch bench grinder, and a Weaver arbor press.

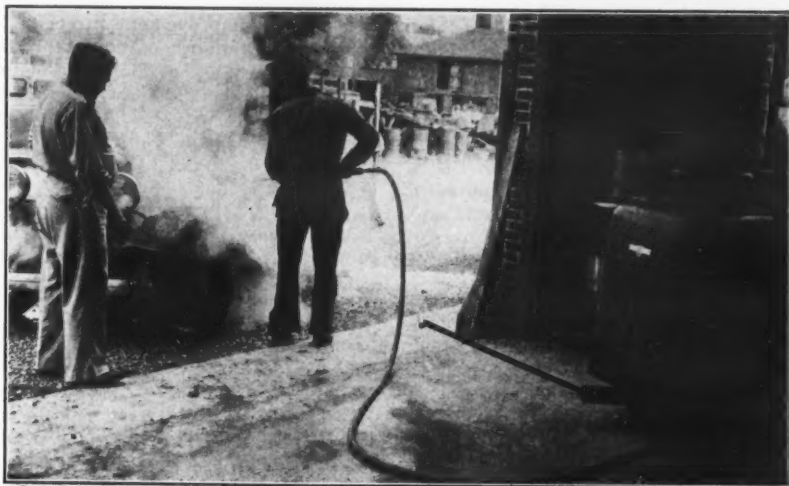
Adjoining the east side of the main building at the north corner is a new modern wing which was completed in 1946 to house important maintenance and repair facilities. This addition has a 50-foot front on Parsons Avenue, is 32 feet 6 inches deep, and was built with 2-foot concrete foundation walls below the level of the ground. From the ground up, the walls are red brick

topped by an insulated roof 18 feet above the concrete floor. Three 12 x 12-foot overhead doors open on Parsons Avenue to the east.

Inside along the west wall are connecting doors to the stock room and blacksmith shop. The wing is heated by steam from a National low-pressure coal-burning boiler equipped with a Winkler stoker. The boiler room and coal-storage area occupies a 16 x 32½-foot section of the cellar. In the summer the building is cooled by a ventilating fan on the roof. In addition to windows in the north and south walls, eight fluorescent lights hang from the roof to illuminate the interior. The construction of the new wing is completely fire-proof, and the doors leading to the old shop are metal-covered.

#### Shop Tools

When equipment is brought to the new shop for maintenance or repairs, it is first thoroughly steam-cleaned of dirt and grease by a Hyppressure Jenny. Small parts are cleaned in a tank, 18

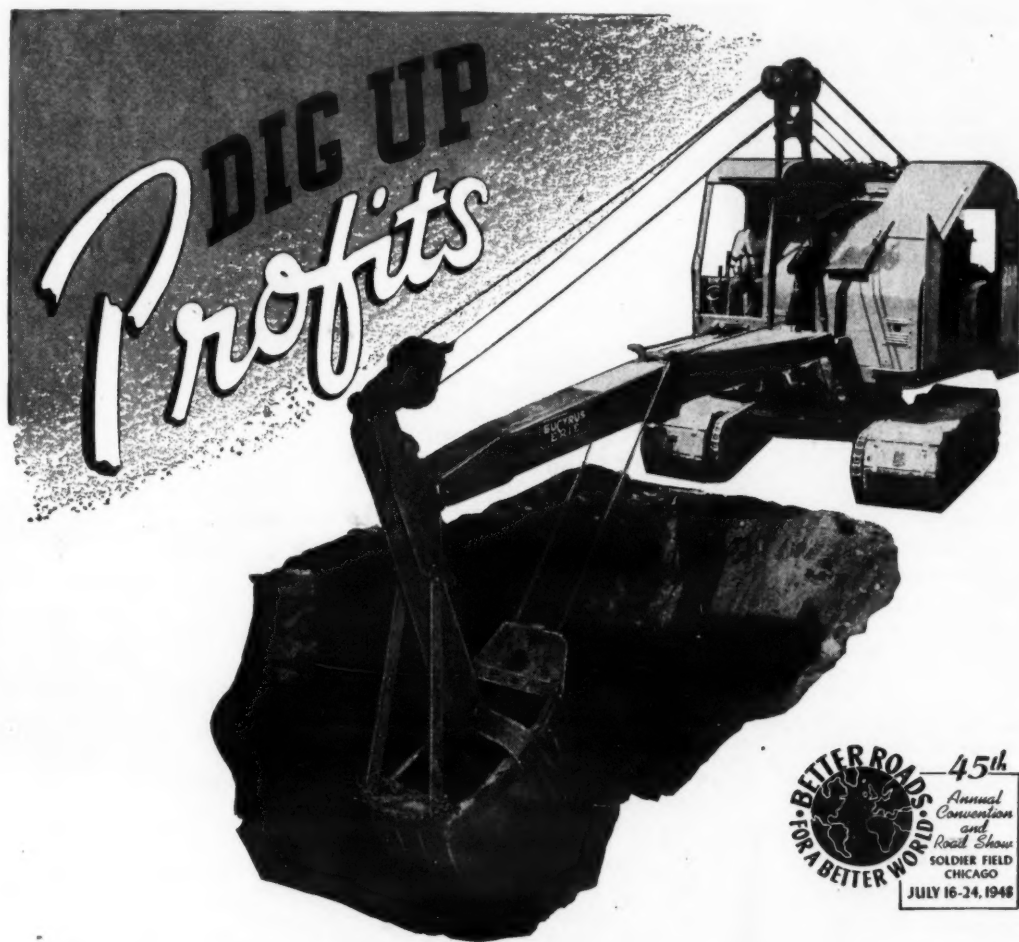


C. & E. M. Photo

Equipment brought to the new Delaware County shop is first thoroughly steam-cleaned of dirt and grease by a Hyppressure Jenny.

inches square x 9 inches deep, containing a 5-gallon solution of Magnus cleaner. Inside the north of the three en-

trance doors is a Weaver twin-post 10-ton floor lift on which equipment (Concluded on next page)



Sewer trenches and basement excavations yield profits with the Bucyrus-Erie 10-B, 15-B and 22-B dragshovels. Fast and effective, they combine a quick hoist and swing with a powerful digging stroke that fills the dipper at every pass, for a rapid overall cycle that eats up work and boosts output.

The dragshovel dipper, too, adds to efficiency. With a long extended dipper lip that penetrates easily and supplements the relatively long side cutters to hold extra material, it has a high arch that permits easy filling without voids. The 10-B dipper is all-welded, shaped

for fast penetration, accurate digging and quick dumping. Arch and lip of 15-B and 22-B dippers are of a single, heat-treated casting, while the rest of the dipper is of streamlined, all-welded construction matching great strength with a front-to-rear taper for fast dumping and clearance in wide trench work.

Dragshovel efficiency is only one of the features which have made the Bucyrus-Erie 10-B, 15-B and 22-B excavators world famous. With any front end equipment they are fast, profitable performers. It will pay you to see your Bucyrus-Erie distributor for more information.

## AIRPLANE MAPPING AND PHOTOGRAPHY

### CHICAGO AERIAL SURVEY COMPANY

332 South Michigan Ave.  
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**BUCYRUS  
ERIE**

SOUTH MILWAUKEE • WISCONSIN



## County Digs Ditches To Drain Farm Lands

(Continued from preceding page)

may be raised for inspection or lubrication. Greasing is done with either U. S. or Alemite pressure guns. Compressed air for the various shop functions is supplied by a Champion S5 air compressor. DeVilbiss spray guns are available for painting the equipment.

Machines in for repairs are jacked up on Walker 5-ton floor jacks. Lifting may also be done on a 2-ton electric hoist hung from a roof I-beam. Smaller units are serviced on a 3 x 10-foot wooden workbench at the rear of the room. Shop tools include a Black & Decker 10-inch bench grinder, a Black & Decker 1/2-inch electric drill, pipe dies for 1/8-inch to 2-inch pipe, bolt dies for 1/4-inch to 3/4-inch bolts, and a couple of 6-inch bench vises. On order, or recently delivered, is such other equipment as a Hall valve-seat grinder, a Kwik-Way valve refacer, and a Sunnen bushing hone.

### County Equipment

Another building on the lot is a 120 x 25-foot storage shed used to house equipment. It has a dirt floor and corrugated-metal sides and roof, and is open on one side. In the yard are stockpiles of stone available for road patching. At the rear of the main building are a 10,000-gallon storage tank for bituminous material, and a 2,000-gallon and a 1,000-gallon underground tank for gasoline and fuel oil.

The Delaware County equipment serviced and stored at the shop and garage includes the following:

- 14 trucks—6 Chevrolets, 3 Fords, 3 Dodges, 1 Mack, 1 International
- 2 Ross V-type snow plows
- 1 Austin-Western straight-blade snow plow
- 1 Koehring 1/2-yard dragline
- 2 International tractors with Hough loader attachments
- 2 Austin-Western 99-M motor graders
- 1 Adams motor grader
- 2 Gledhill drag maintainers
- 3 International mowing machines
- 1 Case mowing machine
- 1 Etnyre 1,000-gallon distributor on a Federal truck
- 2 Burch 10-foot spreader boxes
- 1 Cleaver-Brooks portable tank-car heater
- 1 Littleford tar patching kettle
- 1 White bituminous kettle
- 1 Littleford power broom
- 1 Huber 10-ton 3-wheel roller
- 1 Galion 10-ton 3-wheel roller
- 1 Galion portable patch roller
- 1 Lincoln electric welder
- 1 oxyacetylene welding set
- 1 10-ton low-bed trailer

In its maintenance operations Delaware County employs an average force of 25 men under the direction of the County Engineer.

### Development and Control Of Missouri River Basin

An illustrated pamphlet which describes the flood-control and river-development program in the Missouri River Basin has been prepared by the Missouri River Division of the Corps of Engineers. It was written with a view to presenting a concise account of the comprehensive civil-works program of the Corps of Engineers on the Missouri River and its tributaries.

The 23-page pamphlet describes the early development of the Missouri, the formation of a constructive program, the overall plan for flood control and other purposes, and services performed by the controlled river. Illustrations and maps show the location of the various projects; engineers' sketches show the dams; and photographs show the construction progress and scenes of flood damage.

An appendix gives complete details on the Corps of Engineers part of the project. There are figures and data on stream flow for the main stem of the Missouri River and its principal tributaries. A list of the major construction contracts includes the name of the project, features of the work, the contractor, and the cost. There are data on improvements for navigation; on authorized dam and reservoir projects; and on authorized levee, flood-wall,

and channel-improvement projects.

A limited number of copies of the booklet is available at the Office of the Division Engineer, Missouri River Division, Farm Credit Bldg., 19th and Douglas Sts., Omaha, Nebr.

### Data on Tractor Shovel

A folder on the Model TS-5 tractor shovel is being distributed by the Tractomotive Corp., 101 W. Sandusky St., Findlay, Ohio. Folder No. 605-A features pictures of the Tracto-Shovel in use, showing the operational and constructional advantages claimed for it by the manufacturer. The Tracto-Shovel is designed as supplementary equipment for the Model HD-5 Allis-Chalmers crawler tractor.

The folder shows the shovel going through loading cycle, points out its adaptability to use with a bulldozer, and lists other features.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 99.

## POWER to Give Dirt, Rust, Scale

### the Brush-Off!



Mount a tough, longer-lasting Van Dorn "Whirlwind" Wire Cup Brush on a powerful Van Dorn Portable Electric Sander—for removing rust, dirt, scale, grease, tar and old paint from construction equipment and materials! Drives other attachments for sanding any surface, grinding any metal, shaping and semi-finishing lumber, too. Powerful Van Dorn-built motor. Matched and lapped spiral bevel gears of heat-treated alloy. Complete protective sealing against dust and dirt. See your nearby Van Dorn Distributor for details. Write for free catalog to: The Van Dorn Electric Tool Co., 787 Joppa Road, Towson 4, Md.

For Power Specify

**"Van Dorn"**

(DIV. OF BLACK & DECKER MFG. CO.)

PORTABLE ELECTRIC TOOLS

**TEXAS  
U.S.  
ROUTE 66**

● The day this picture was made the Austin Road Company of Dallas, Texas laid 8,220 ft. of 3 ft. shoulder to widen Route 66 east of Amarillo. In spite of the fact that traffic was maintained, high daily output placements ran up to 8,500 ft.

Simple equipment, a well coordinated organization and a MultiFoote 34-E Paver made this record possible!

One of the outstanding things about MultiFoote Pavers is their dependability. They are built to keep a 'running. Simplicity of design makes upkeep and adjustment easy. Smooth control from the high operating platform, the wide skip, the split-second discharge and the fast acting bucket get material on the road in a hurry. These are the things that make records.

You can have this same MultiFoote performance on your jobs too. Let us send you the details on MultiFoote design and construction. You will be interested in MultiFoote advantages.

Also see page 107

**THE FOOTE COMPANY, INC.**  
1916 State Street, Nunda, New York

**MULTIFOOTE  
CONCRETE PAVERS**

Builders of

Adnun Black Top Pavers, MultiFoote Concrete Pavers and Foote Kinetic Mixers

## MAKING THE NATION'S GREATEST HIGHWAY SAFER IN RECORD TIME!



Ask about  
the MultiFoote Duo  
Mix (Dual Drum Paver)  
and the Adnun Black  
Top Paver



"Hey, Joe! I'm going to revolutionize this dam game."

### Gas-Cylinder Opener

A hand device for opening and closing compressed-gas cylinders, without recourse to a wrench, is announced by Nutmeg Industries, 45 Deacon St., Bridgeport 7, Conn. The E-Z-Opener slips over a standard cylinder valve handle and is held in place by a set screw. According to the manufacturer, the valve of the tank, is then easily opened or closed without the need for other tools.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 2.

### Tyson Bearing Promotions

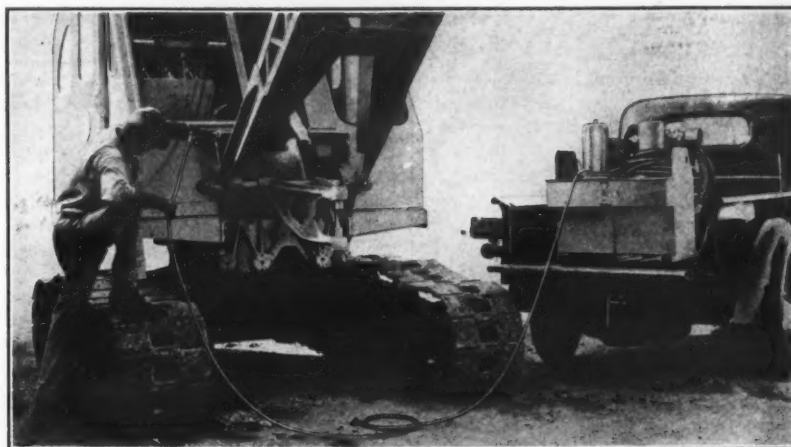
Several personnel promotions are announced by the Tyson Bearing Corp., Massillon, Ohio. George C. McMullen is now Vice President in Charge of

Sales; W. H. Oexle is General Sales Manager; Herschel J. Deal is now Vice President in charge of the midwest territory with headquarters in Chicago; Ivan C. Mann is Assistant Sales Manager; R. R. Flaisig is Tyson representative in the western Pennsylvania, western New York, and West Virginia territory with headquarters at the Massillon office; E. M. Smith is in charge of the northeastern territory with headquarters in Philadelphia; and Carl M. Behm is representative in Ohio and Michigan.

### Lubricating Unit Is Made in Two Mounts

A portable lubricating unit is made by the Gray Co., Inc., 60 Eleventh Ave., N. E. Minneapolis 13, Minn. Known as the Trail-Luber, it is recommended by the manufacturer for servicing tractors, shovels, cranes, crushers, graders, scrapers, and other heavy-duty equipment. It is made in two models: a skid-mounted unit for use on a pick-up truck or for stationary mounting; and a trailer-mounted unit for pulling behind a car, truck, or tractor. The trailer unit is mounted on automotive-type wheels with pneumatic tires, and it has a tongue, tongue stand, and trailer hitch.

The unit consists of a 2-compartment hopper for pressure lube and gear lube; two air-operated pumps; two 20-foot lubricant hose with suitable adapters; one 25-foot air hose with an air-line coupler, tire chuck, and blower valve; a Briggs & Stratton Type A heavy-duty engine rated at 1 1/4 hp; and an air compressor with a 15-gallon storage tank, rated to deliver 7 cubic feet of air per



On the truck at the right is a skid-mounted Graco Trail-Luber, a portable unit for lubricating tractors, shovels, cranes, etc. It also comes in a trailer-mounted model.

minute.

Further information may be secured

from the company, or by using the enclosed Request Card. Circle No. 24.

## Those Small Jobs Go Easier and Faster with

**SYNTRON**

## CONSTRUCTION and MAINTENANCE TOOLS

Busting concrete, digging clay, shale and frozen ground; cutting asphalt and tamping backfill—with Gasoline Hammer Paving Breakers.

Drilling, cutting, chipping concrete and masonry; vibrating concrete forms and molds; scaling concrete, rust and old paint from equipment—with Electric Hammers.

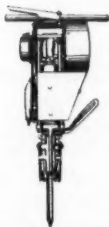
Drilling, sanding, buffing and polishing wood and metal with Electric Drills and Sanders. Grinding welds and wire brush work with Electric Grinders.

Vibrating thin wall forms; burial vault forms, pipe forms and other precast concrete products with electromagnetic Form Vibrators. Vibrating bridge decks, floor slabs, piers, etc., with flexible shaft Mass Vibrators.

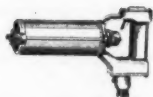
Write for literature on this TIME AND COST SAVING equipment.

**SYNTRON CO.**

227 Lexington, Homer City, Pa.



"Gasoline Hammer"  
PAVING BREAKERS  
100% Self Contained



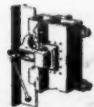
"Portable"  
ELECTRIC HAMMERS



"Portable"  
ELECTRIC DRILLS



Portable Electric  
GRINDERS—SANDERS



CONCRETE VIBRATORS

FOR PROFITS-JOB AFTER JOB

Roll with

**GALION**

### THREE-WHEEL

The roller that does an unrivaled job of compaction on fills and other primary rolling. 6-7-8 and 12 ton sizes.

### TANDEM

Rolls out a top surface of superior smoothness and density. Highly maneuverable for precision rolling. 3-5-8 and 10 ton sizes—variable from 3 up to 14 tons.

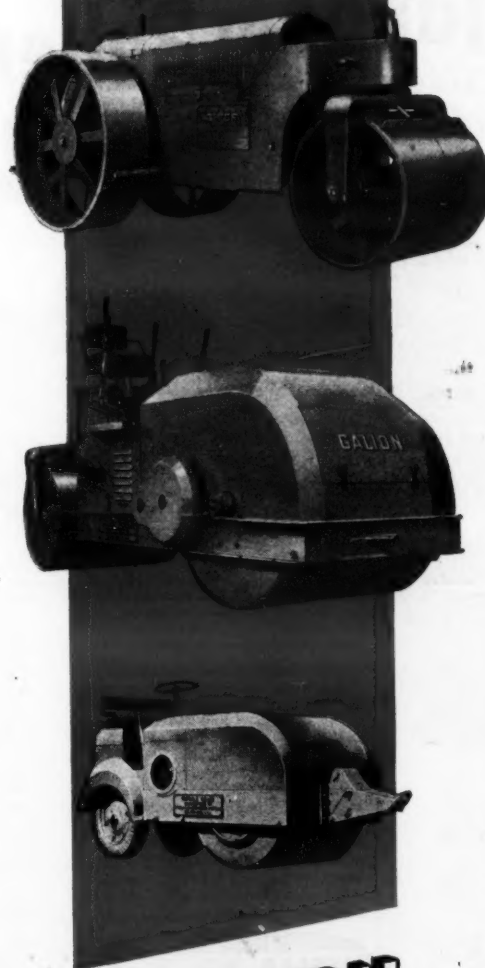
### PORTABLE

Puts surface maintenance on an economical basis. Easy to move from job to job—yet it does a thorough job of compaction. Weight 6700 lbs., variable up to 9367 lbs.

Write for name of nearest GALION Distributor.

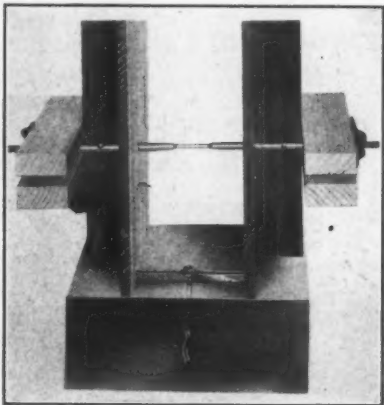
The GALION IRON WORKS & MFG. CO.

General and Export Sales Office  
GALION, OHIO, U. S. A.



**GALION**  
WORKS





Here is a new Williams hardware combination for wood-form construction, consisting of she-bolt clamps, wale supports, and form aligners.

### Spacing, Alignment Of Concrete Forms

Hardware for spacing concrete forms is made by the Williams Form Engineering Corp., 1501 Madison Ave., S. E., Grand Rapids, Mich. The accompanying photo shows a form set-up using the Williams equipment. It illustrates a section of a standard form—set on a concrete footing—using 2 x 4 wales and studs, and 1-inch sheathing.

The proper spacing of the forms at the footing level is achieved by an adjustable form aligner anchored in the footing. This consists of two parallel bars clamped onto the protruding end of a pigtail anchor, set about midway between the forms. These parallel bars are set and tightened when they are at the proper spacing.

Spacing above the footing level is maintained by a special Williams set-up. In the example shown, a nail is driven through the she-bolt and into the stud. External form pressure is secured by the outer fly-nut castings on the she-bolt. These castings are adjusted by hitting the lugs with a

hammer. Williams points out that the she-bolt itself does not require a wrench for removal as it contains a cross drill for locking the outer castings with a 16-penny nail. The metal wale support, shown at the left in the photo, when nailed to the stud with one or two 8-penny nails, is said to be strong enough to support the weight of two or three men on the wales. The heel of this support is in compression against the stud, and this is said to lessen the tendency of the nails to shear off.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 19.

### LeTourneau Market Policy For New Line of Products

An expansion of its marketing program has been announced by R. G. LeTourneau, Inc., for its new diversified line of products. These include the Tournalayer, Tournamixer, Tournacran, and Tournahauler. Under the expanded program, LeTourneau is organizing a new group of specialized distributors to be directed from the Tournalayer Division headquarters in Longview. R. L. LeTourneau is General Manager of the Division.

Present LeTourneau distributors will continue to market LeTourneau's earth-moving products and similar types of equipment. These include Tournapulls, Tournadozers, Carryall scrapers, and Rooters. This organizational set-up will remain unchanged, and will be directed from the Peoria, Ill., headquarters.

### Fine-Grader Converter

A folder on a gage designed to convert a standard road grader for use as a fine-grading piece of equipment can be obtained from the Road Grader Gauge Corp., Equitable Trust Bldg., Wilmington, Del.

The folder shows several pictures of

the gage as designed for various makes of grader. It will fit Adams, Allis-Chalmers, Austin-Western, and Caterpillar equipment. Photographs show how the unit works, and letters from users have been reproduced to attest its efficiency.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 98.

### Lowther Moves to Joliet

The Harry A. Lowther Co., Inc., has moved to its recently acquired plant on Industry Ave. in Joliet, Ill. This move brings about a centralization of all the company's activities in one building. Lowther is the manufacturer of the C-Saw and related equipment.

# Cutting

# WIRE ROPE

# is easy



- **FAST** Specially designed cutting blade and dies ensure fast cutting action. The hammer principle eliminates any special skill requirements.
- **CLEAN** Wire rope ends are cut smooth and clean for perfect threading or splicing.
- **SAFE** The enclosed cutting blade locked in the body of the cutter assures perfect safety.
- **PORTABLE** Models for tool kit or stationary operation. With cutting capacities up to: 1 inch, 1 1/16 inch, 1 1/2 inch.

## the

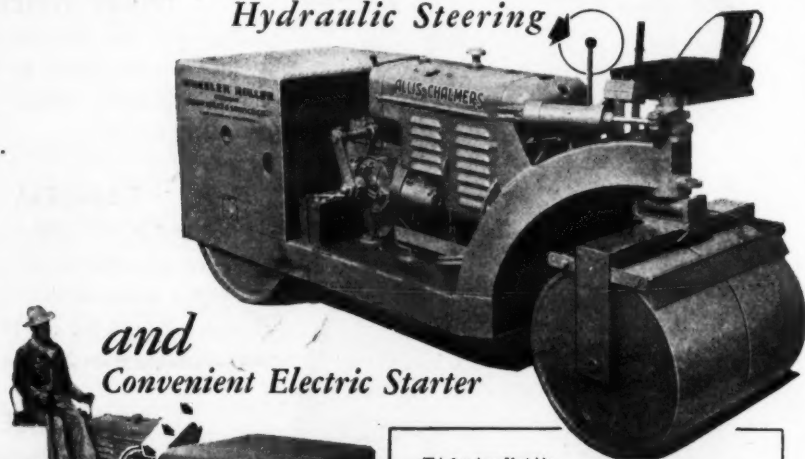
# MORSE-STARRETT

## Way

SEE YOUR DEALER OR WRITE DEPT. "B"  
**MORSE-STARRETT PRODUCTS COMPANY**  
 1204 - 49th AVENUE, OAKLAND 1, CALIFORNIA

## WHEELER Tandem Rollers

Bring you Single-Lever Hydraulic Steering



and

Convenient Electric Starter

This 3 to 4 ton Variable-Weight roller is popular on the job. Its convenient features include the single-lever clutch, the foot operated parking brake and easier maneuverability.

Wheeler Tandem Roller's single lever, hydraulic steering and electric starter can improve your on the job efficiency. The Hydraulic steering is engine powered. Operating by finger tip control, the steering knob moves to right or left, leaving the operator free to devote full attention to the rolling job at hand. Turning and maneuvering is greatly simplified; the square footage rolled per day can be increased. This single steering knob is the only control needed to slowly or quickly turn a Wheeler Roller in any direction. Convenience means faster operation.

**ELECTRIC STARTER AIDS OPERATION**  
 The electric starter, now offered with the Wheeler Roller, simplifies starting and stopping. Idle running time is reduced and waste of fuel is minimized. Well within the operator's reach, the starter reduces the operator's labor and operating time.

NEW DEALERS are being added—Choice territories are still available

### WHEELER ROLLER

Division **SHAW SALES & SERVICE CO.**  
 5100 Anaheim-Telegraph Road, Los Angeles 22, California

#### SPECIFICATIONS

**POWER:** Allis-Chalmers Industrial Model B. 24.5 Brake Horsepower @ 1500 RPM; 27.8 Brake Horsepower @ 1800 RPM. Speeds 2 forward and 2 reverse give 1.55 to 4 MPH range in either direction.

**DIMENSIONS:** Wheel Base 7' 10"; length overall 10' 7"; width overall 3' 6". Tank height 4' 10". Ground clearance 10" Left side clearance 1 1/2".

**WEIGHTS:** Shipping weight (approximately) 5500 lbs. Maximum weight (with ballast) 8000 lbs. Extra metal weight 400 lbs.

**COMPRESSION:** Per Lineal Inch: Compaction roller, 150 lbs. with ballast. Steering roller 70 lbs. with ballast.

**TIMKEN BEARING EQUIPPED THROUGHOUT**  
 Write for new 6-page folder.

## A New Line of Portable Cement Bins

**TYPE "M"** a complete single compartment bulk cement storage and batching plant designed for easy portability. Made with 2 or 3 sections. This efficient, low cost plant eliminates all the inconvenience and waste from handling bag cement. A selection of weighing Cemeters provides accurate batching of cement to batch trucks and truck mixers. Write for Bulletin M.

BINS	CAPACITY	
	CUBIC YARDS	BARRELS OF CEMENT
M-1	29	172 to 194
M-2	45	270 to 304
M-3	73	437 to 492

**TYPE "L" LINE**  
 For Larger Sizes, 540 to 1000 bbls.  
 Write for Bulletin L



Type M3-73 Cu. yd. Cement Plant

## ERIE AGGREGATE PLANTS

*Erie Steel Construction Co. 285 Geist Rd., Erie, Pa.*

BUCKETS • AGGREGATES • PORTABLE CONCRETE PLANTS

# Rolled-Earth Dam Will Control Floods

## Embankment Built Within Indian Reservation Has Outlet Tunnel, Concrete Side-Channel Spillway

• A FLOOD-CONTROL project authorized in the 1941 Federal Flood Control Act to protect the city of Syracuse, N. Y., got off to a good start in 1947. The initial unit of the project, the construction of rolled-earth embankment-type Onondaga Dam, is scheduled for completion this year. The dam is located at the south end of the Onondaga Indian Reservation, 1,700 feet below the confluence of the two branches of Onondaga Creek, and 4 miles south of the Syracuse city line.

When completed, the dam, which lies about due east-west, will be 1,800 feet long, and will rise 68 feet above the valley floor. It will contain over 500,000 yards of fill. An outlet tunnel through the embankment, with intake and outlet structures, will accommodate the normal flow of Onondaga Creek which continues northwards through Syracuse to empty in Onondaga Lake. Through the rock of the east or downstream right abutment, a side-channel concrete spillway, with a weir crest length of 200 feet and a paved channel, will carry the water when the creek is high and backs up behind the new dam.

The war, with the subsequent freeze order on flood-control work, kept this project from getting started seven years ago as was intended. As soon as possible after the war, however, the U. S. Corps of Engineers, Buffalo District of the Great Lakes Division, awarded a contract for the construction to S. J. Groves & Sons Co. of Minneapolis, Minn., on its low bid of \$1,738,602. The job started in May, 1947, and is expected to be completed in October, 1948.

### Long-Needed Flood Control

Syracuse, which grew up around the salt springs in the flat lands at the southern end of Onondaga Lake, is the third largest city in upstate New York, with a population of 210,000. It is generally considered the most important commercial and industrial center of the middle section of the state. Although Syracuse has been a city for 100 years, its position at the mouth of Onondaga Creek has always contained the menace of flood from the uncontrolled waters. The city took steps to check the flood threat when it paved the creek channel for a distance of about 5 miles above its mouth. But this channel which carries the creek through and, in places, under the streets of the city, was not by itself sufficient to control flood waters.

Accordingly the comprehensive flood-control plan of the Corps of Engineers is being put into effect. The first unit—the dam and reservoir—is already on the way to completion. The second unit, which will be handled under another contract, will include the extension of the improved Onondaga Creek channel in that reach between Ballantyne Road and Dorwin Avenue south of the city.

When the plan is realized in construction, the city of Syracuse will no longer be in danger from floods. The entire project will cost more than \$3,180,000, but the design of the structures will offer protection from floods of more than twice the magnitude of the greatest on record.

Under terms of the authorization, the Federal government assumes all costs of construction, and the State of New York bears the cost of land, easements, and right-of-way. The State will also maintain and operate the project after completion. When full, the reservoir area will cover 860 acres, 270 of which are in the Indian Reservation. No permanent lake is intended, however, and the reservoir will fill up only in periods

(Continued on next page)



C. & E. M. Photo

Looking east from high up on the west abutment, we get a full sweep of the work on Onondaga Dam. When completed it will be 1,800 feet long and will rise 68 feet above the valley floor. It will contain over 500,000 yards of fill.



• Now available with 18.00 x 26 industrial tires the Case "LAI" brings new capability to rubber-tired traction. Its individually-controlled hydraulic brakes bring new ease to stopping and to steering. Its comfortable seat and convenient controls conserve the operator's time and strength.

The "LAI" is built even better than the prior "LI," long famous for ENDURANCE. It runs in high gear . . . as much as the job may call for . . . without running up its maintenance costs. It rolls from job to job on its own rubber, takes no special transport equipment.

Teamed up with earth-handling equipment to match, it fills the gap between smaller outfits that accomplish too little and bigger units that may cost too much for the work to be done. Adapted to four-yard dig-and-carry scrapers, one-yard loaders and other units of comparable size, it strikes a happy balance of pull and speed, cost and capacity.

• Here the "LAI" powers a hydraulic shovel-loader that digs, lifts, carries, and dumps quickly or slowly as desired.

• Equipped for complete hydraulic control, the Case "LAI" hustles the haul with this 4-yard dig-and-carry scraper.



• Hooked to the old reliable sheeps-foot roller, the "LAI" handles the job of earth packing effectively and economically.



# CASE

**GRIFFIN**  
**WELLPOINT SYSTEMS**  
**JETTING PUMPS**  
.....  
**GRIFFIN WELLPOINT CORP.**  
881 E. 141st ST., N.Y. 54, N.Y.  
TEL. ME. 5-7704



## Rolled-Earth Dam Will Control Floods

(Continued from preceding page)

of extreme high water. At spillway crest the reservoir will have a capacity of 16,800 acre-feet.

### Land Acquisition

Before the project could be undertaken, an interesting situation arose in acquiring the necessary land. This land was owned partly by the Onondaga Nation, by 21 individual Indians, and also included some State-owned property. According to treaty rights with the Federal government and the State of New York, the Onondaga Nation of Indians enjoys the use and occupancy of such lands in perpetuity, with the pre-emptive right of purchase by the State of New York and the Federal government. Under these treaties, the Onondaga Nation can surrender the use and occupancy of all or any part of the Reservation to the State or Federal government by the action of the Council of Chiefs of the Nation.

The Council of Chiefs held a referendum among the members of the Onondaga Nation which approved by a 5 to 1 ratio the granting of the land rights to the State.

Under the terms of the agreement the State paid the Onondaga Nation \$40,000 for communal property acquired from it. Separate settlements were made with individuals whose property was involved.

Many of the Onondaga Nation are employed on the construction of the dam, including George Thomas, Chief of the Chiefs' Council of the Onondaga Nation, and President of the Six Nations Federation of the Iroquois. Now 61, Chief Thomas is a cultured, well educated Indian who still weighs the 175 pounds he did when he played in the same backfield with Jim Thorpe on the Carlisle Indians football team. The Chief was also a shot-put star at the well known Indian school.

Another tribal chief, Floyd Henhawk, is a Labor Foreman at the dam. Practically all the clearing and grubbing at the site was done by a force of 50 Indians. The rock-drilling and rock-handling crews were partially made up of Indians. About 600 live on the reservation.

### Rolled-Earth Dam

The top of the 1,800-foot rolled-earth dam is at elevation 526.0. Side slopes, both up and downstream, are 3 to 1 at the bottom, decreasing in flatness until they are 2 to 1 near the top. The maximum distance through the base is 1,600 feet. The bulk of the fill used in the dam is random pervious material. But the upstream face is covered with a 3-foot-minimum layer of impervious material, which increases in thickness around the toe. On top of the impervious layer is a 12-inch gravel-sand blanket as a base for a 3-foot course of dumped riprap which extends from toe to top of the upstream face as a protection against wave action. A heavy rock fill is also placed at the downstream toe of the dam and continues up the slope to elevation 500.0. It was dumped on a 2-foot sand-gravel blanket.

When completed, the dam will carry a 25-foot bituminous access road across its top from the relocated State Route 11-A on the east, to a turn-around circle on the west or left downstream bank. At the east end the road crosses the spillway on a steel bridge. The outlet tunnel is a 6½-foot-diameter circular concrete conduit, 343 feet long. It was constructed in a trench dug out of the rock a few hundred feet from the right abutment. Besides the intake and outlet structures, the tunnel is provided with a gage well and gage house. The outlet will be uncontrolled, with a capacity of 1,270 cubic feet per second

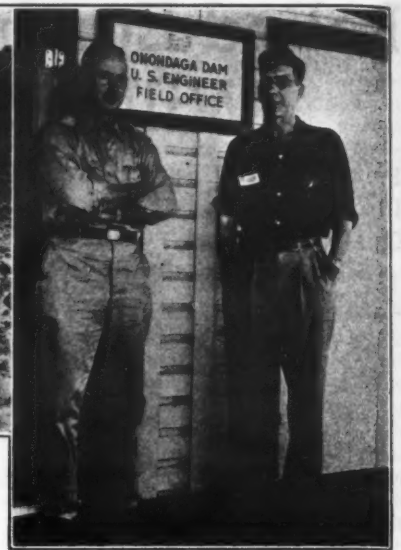


C. & E. M. Photos  
An Onondaga tribal chief, Floyd Henhawk (left, in photo above), is a Labor Foreman at Onondaga Dam. Next to him is George Thomas, Chief of the Chiefs' Council of the Onondaga Nation. And next is Jack Conway, Dirt-Moving Superintendent for S. J. Groves & Sons. In this photo at right are Lt. Colonel Kelly (left), Project Engineer for the Corps of Engineers, and Fran H. Hiestand, Project Manager for the contractor.

when the pond has reached spillway crest.

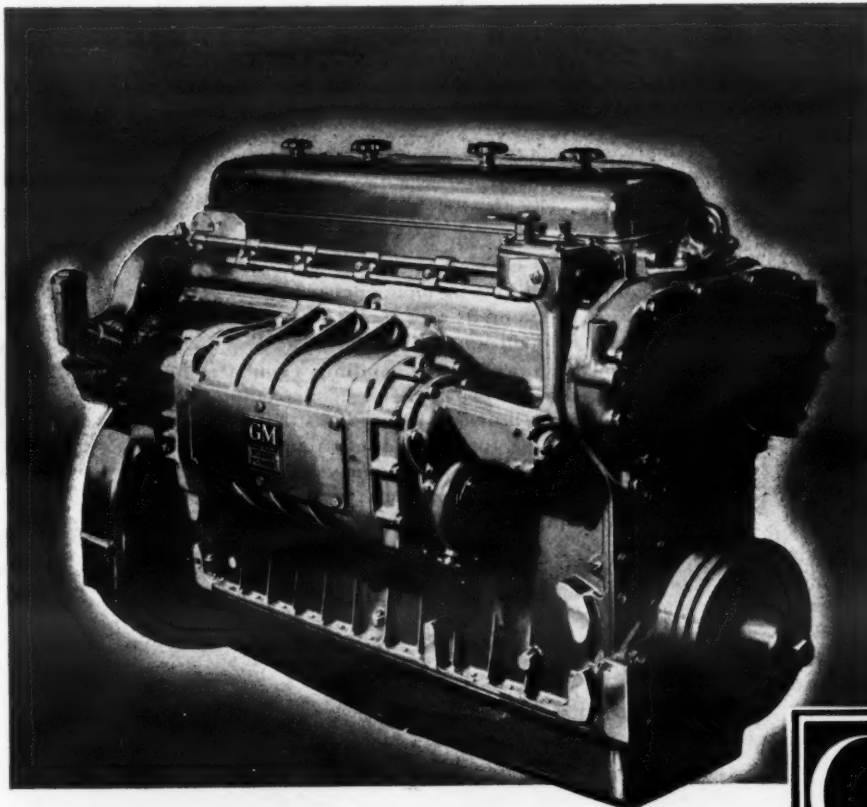
The normal flow of Onondaga Creek

will be through an intake channel upstream of the dam, which is paved with 2 feet of dumped riprap. From this

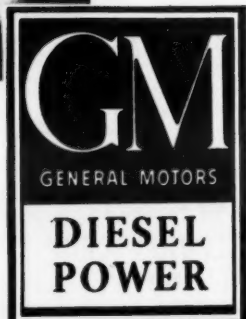


channel it flows through the tunnel under the dam, and thence into the out-  
(Continued on next page)

# GREAT FOR FINE



*Diesel Brawn  
Without  
the Bulk*



**DETROIT DIESEL ENGINE DIVISION**

SINGLE ENGINES... Up to 200 H.P.

DETROIT 28, MICHIGAN

MULTIPLE UNITS... Up to 800 H.P.

**GENERAL MOTORS**

let channel which has a stilling basin just below the dam to reduce discharge velocities. In flood time, when the tunnel cannot take the full creek flow, the waters will continue from the intake channel to an approach channel. At the east end of the dam this channel ends in a concrete spillway with a weir crest length of 200 feet with a crest elevation of 504.5.

From the crest of spillway the flow will continue around the east end of the dam through a concrete spillway channel built in rock excavated along the right abutment. The spillway channel, which is about 1,000 feet long, gradually swings back to join the outlet channel below the dam. The spillway channel averages 52 feet wide and required a maximum cut of 44 feet into rock. The channel, opposite the weir and for 100 feet below, is lined with concrete. A 6-foot-high concrete sill is provided at the lower end of the weir to stabilize the flow. The 300-foot paved channel has a concrete floor 20 inches thick, and side walls varying in thick-



C. & E. M. Photo  
Ingersoll-Rand wagon drills work in a rock cut on the Groves contract at Onondaga Dam. The rock excavation item totaled 94,000 cubic yards.

ness from 20 to 18 inches. The excavated rock was used for riprap on the slopes of the dam, and for paving the channel around the spillway.

#### Plan of Operations

After the dam site was cleared and grubbed, Onondaga Creek was diverted from the center of the valley floor, lying between north-south ridges on either side, by digging a new channel in the earth at the foot of the westerly hills. No trouble was experienced in dragline excavation along this side, as the rock lay chiefly along the east side of the valley. A toe trench for the rock fill was dug out for the downstream dam slope, and an inspection ditch was excavated along the upstream toe. Other inspection and leaching trenches were dug—both to drain the marshy valley, and to determine if any suitable material was available as fill for the dam.

All the material was unsuitable for the random, pervious, interior mass fill of the dam, since it was a sandy clay in which was mixed a little silt and gravel. It could be used, however, for the impervious upstream-slope face. The unsuitable material was stripped from the area to be occupied by the embankment by excavating in places



C. & E. M. Photo  
A Northwest 80-D 2 1/4-yard shovel loads a bottom-dump Euclid in a hillside borrow pit which S. J. Groves & Sons Co. opened up for its contract at Onondaga Dam in New York State.

to depths of 10 to 12 feet. The dragline excavation was handled by a Bucyrus-Erie crane with a 65-foot boom and a Hendrix 2-yard bucket, and a Lima Paymaster crane with a 50-foot boom and a Page 3/4-yard bucket.

Other work scheduled for the first construction season included the spillway excavation and building the concrete conduit through which the creek was re-diverted to permit completion of the embankment along the west or left abutment. Despite the wet spring and summer, good progress was made on the earth embankment for the dam. The fill was completed last year, and the gap closed in the temporary creek channel. As protection against high water while the dam fill was being placed, cofferdams or earth dikes were built both up and downstream of the dam, and along the west side of the construction area on the bank of the creek channel. These dikes were built up to elevation 478 with impervious material from the general excavation around the dam site. This height offered a good margin of safety, as the normal level of the creek is at elevation 456.

#### Rock Excavation

The rock excavation item totaled 94,000 cubic yards, primarily from the excavation for the outlet tunnel and the spillway. Blast holes were drilled with 10 wagon drills—5 Ingersoll-Rands and 5 Gardner-Denvers—with air supplied from 6 compressors. Of the compressors 3 were Gardner-Denvers—two 500-cfm and one 365-cfm; 2 were 500-cfm Ingersoll-Rands; and the other was a Chicago Pneumatic 500-cfm. Four of the 500-cfm units were hooked up to an air receiver, a cylindrical tank 24 feet long x 3 feet in diameter. The others supplemented this air supply. In the deepest cuts the rock was removed in two 20-foot lifts and a single lift of from 6 to 8 feet.

Drill steel, 1 inch in diameter and in 7 and 14-foot lengths, was used in conjunction with Timken rock bits which reduced in size from a maximum of 2 3/4-inch. The blast holes were drilled usually on 3-foot centers both ways. They were charged with from 4 to 10 sticks of Hercules 50 per cent Gelamite for each of the 12-foot holes. The remaining upper part of the hole was filled with sand stemming material. The maximum charge at a time was 130 holes.

For line drilling along the sides of the cut, the holes were spaced so that there was not more than 2 inches of rock between each. No charge was placed in these holes, however. After the blast the broken rock was excavated by a Northwest 80-D 2 1/4-yard shovel which loaded to 4 end-dump Euclids hauling about 10 yards a load. The rock work proceeded along with the construction of the earth embankment. As the fill went up, the stone riprap was added along with it on the slopes, the Euclids end-dumping the material from the rock cuts.

(Continued on next page)

# DIESELS EQUIPMENT

Today the list of manufacturers, who offer their contractors equipment powered with General Motors "71" Diesels, reads like a "Who's Who" of the industry. They know what these powerful, modern 2-cycle Diesels can do.

They know that these engines with all their power are compact and fit in available space—that they do their work easily and fast. Their 2-cycle operation makes them responsive and quick to pick up

under load. They step up the work done by any kind of equipment.

GM Diesels have been designed for easy servicing. Pistons, liners, valves, and many other parts, are the same for every size Series 71 engine, so there is the maximum interchangeability of parts.

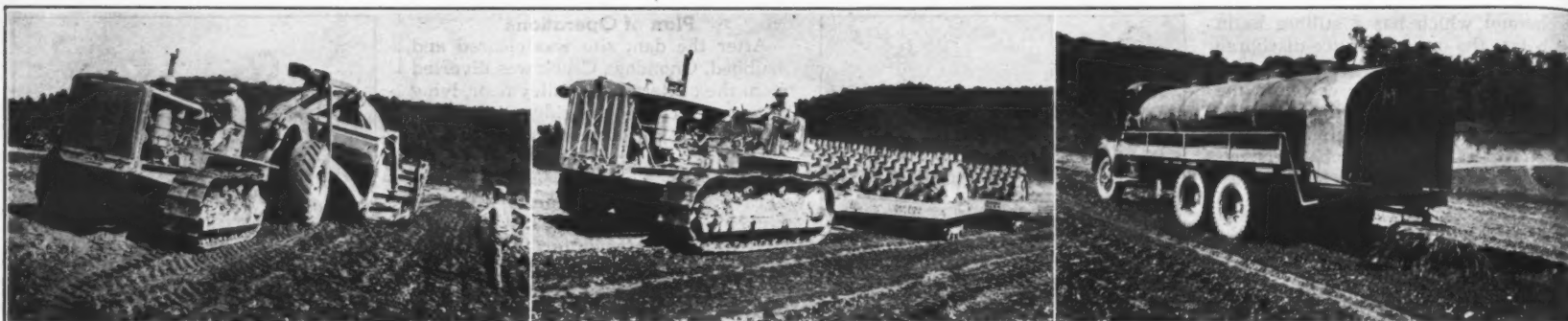
No wonder, then, that America's finest contractors' equipment is being furnished with the General Motors Series 71 Diesel engine.

## LEADING MANUFACTURERS OF THE FOLLOWING EQUIPMENT OFFER GM SERIES 71 DIESEL ENGINES IN THEIR PRODUCTS:

Air Compressors	Feed Mills	Pumps
Arc Welders	Fire Pumps	Road Rollers
Asphalt Plants	Hoists	Rock Crushers
Buses	Industrial Locomotives	Rotary Soil Tillers
Cableways	Locomotive Cranes	Saw Mills
Cranes	Logging Loaders	Screening Plants
Distillation Equipment	Logging Yards	Shovels
Ditchers	Mining Pumps	Soil Stabilizers
Draglines	Motor Graders	Stave Mills
Dredges	Off-The-Road Vehicles	Tractors
Earthmoving Loaders	Oil Field Equipment	Trucks
Evaporation Units	Pavers	Wellpoint Pumps
	Power Scrapers	

IT'S WISE FOR YOU TO SPECIFY GM DIESEL





C. &amp; E. M. Photos

## Rolled-Earth Dam Will Control Floods

(Continued from preceding page)

### Placing the Fill

An excellent source of random pervious material for the downstream mass of the embankment was available high on the west ridge, which borders the valley overlooking the dam site. A bank of sand-gravel containing only a little silt, it was easy to handle and was only a 2,000-foot average haul to the center of the dam. A haul road to the borrow pit crossed the creek channel on three lengths of 72-inch Toncan metal pipe, 40 feet long. This pipe was furnished by the Empire State Culvert Corp. of Groton, N. Y., and trucked to the job.

The borrow material was dug out by another Northwest 80-D 2½-yard shovel, and loaded into a fleet of 6 bottom-dump Euclids carrying 14-yard loads. From the pit the haul road went down the west abutment bank on a 10 per cent grade. A Caterpillar No. 12 motor grader kept it as smooth as a highway to expedite the movement of the big dirt carriers.

A conveyor had been discussed for moving the dirt from the pit to the embankment but was rejected as being unfeasible for two reasons. A shovel, by working from the bottom of the face to the top of the pit, got a better mixture of material as it dug through the various strata with each bite. Then too, if a conveyor system were in use, the material would arrive on the embankment in such a steady stream that it could not be given the required processing. The pervious material, as well as the impervious, had to be brought to the optimum moisture content and compacted to optimum density.

### Compaction

The layer of heavy impervious material was placed on the upstream face of the dam by a fleet of 4 LeTourneau Carryall scrapers pulled by Caterpillar D8 tractors. Three of the scrapers were Model W's, carrying 24 yards, and the fourth was a Model LP hauling 14 yards. Most of the impervious material came from the structural excavation around the dam site. The scrapers were helped in loading by a D8 push tractor. The maximum haul with the tractor-scraper units was 1,000 feet.

Both pervious and impervious material was spread out on the embankment in 6-inch lifts by a couple of D8 dozers. It was compacted by at least six passes of a Gebhard 4-drum sheepfoot roller combination pulled by a D8. The tamping rollers worked two abreast in

tandem and exerted a pressure of 425 pounds per square inch. The drums are 6 feet long, 5 feet in diameter, and have 8-inch feet.

To get the maximum Proctor density at the optimum moisture content, the lifts were watered from two 1,800-gallon tank trucks equipped at the rear with 18-inch-diameter circular splash pans. These round plates produced a sluicing action with the water on the fills that was considered better than

In the first picture, impervious material is dumped on the upstream face of Onondaga Dam by a LeTourneau Model W 24-yard scraper pulled by a Caterpillar D8. In the second, Gebhard sheepfoot rollers are pulled over the lifts by a D8. And in the third, water is applied to the fills from a splash pan at the rear of a tank truck.

wetting down the lifts with a spray bar. For maximum density on the impervious material, the optimum moisture content ran between 11 and 12 per cent. The dry weight of this material averaged 125 pounds to the cubic foot. Little moisture had to be added to the heavy clay.

The pervious material required considerable water except during the rainy spells. Maximum density was achieved with 8 per cent moisture as the optimum. When dry, it weighed from 125 to 130 pounds per cubic foot. Water was pumped from the creek by two Rex 6-

(Continued on next page)

# NATURALUBE

## D.H.D. OIL FOR DIESEL AND HEAVY DUTY MOTORS

# Basically Different 4 WAYS \*

1

### REMOVES HARD CARBON

Nature gave Naturalube remarkable carbon-removing ability. This oil takes harmful carbon off rings, pistons, valves and plugs while the engine runs... cuts power-loss and wear.

2

### STRONGER PROTECTIVE FILM

The naturally tougher film of Naturalube stands up under the heat and shock of heavy duty operation... provides increased protection for motor parts.

3

### GREATER PENETRATION AND ADHESION

Naturally greater penetrative qualities assure constant lubrication of close-fitting parts. Naturalube's greater clinging power assures lubrication from the moment the engine starts.

4

### NON-CORROSIVE—SAFE

Naturalube does not contain nor form substances injurious to bearings and other metal surfaces. It's naturally safe!

### \* RESISTS FORMATION OF SLUDGE

Lion especially reinforces Naturalube D.H.D. to make it resistant to formation of harmful sludge and lacquer... to keep motors cleaner.

### GUARANTEE

If you don't believe that Naturalube D.H.D. is the best oil you have ever used, Lion Oil Company will give you your money back!

Ask your Lion Distributor for complete information about D.H.D. or write to Lion Oil Company, El Dorado, Arkansas.

"Petroleum Promotes Progress"



### STERLING HOISTS

**STERLING QUALITY**

**STERLING MACHINERY CORPORATION**  
405 Southwest Blvd., Kansas City

**LION OIL COMPANY, EL DORADO, ARKANSAS**

inch pumps, into a standpipe where it fed directly into the tank trucks. Motor graders smoothed the tops and sides of the embankments.

Last summer the earth-moving crews worked two 8-hour shifts per day, during which time an average of 5,000 cubic yards of fill per day was placed in the embankment. Light for the evening operations was supplied by four Kohler and two Onan 5-kw light plants mounted on skids. Each plant had a frame tower on which were hung three 1,500-watt bulbs. In the autumn the working schedule was changed to one 10-hour shift.

#### Concrete Operations

The first concrete pour on the tunnel conduit started the latter part of September, 1947, and the 343-foot structure with a 6½-foot-diameter bore was completed last fall. It was built in 20-foot monoliths, two sections, upper and lower, to a monolith, and it contained about 1,000 yards of concrete. Steel reinforcing for the tunnel was supplied by the Truscon Steel Corp. W. F. Saunders & Sons, Inc., of Syracuse supplied ready-mix concrete from its plant, only 3 miles from the dam site. Usually 3 or 4 truck-mixers hauled the concrete which was mixed with Alpha portland air-entraining cement. The concrete was discharged from the truck-mixers into a 1-cubic-yard bucket, and lifted over the forms by one of the cranes.

Forms for the 18-inch tunnel walls were built in a big red barn that had been converted into a carpenter shop. Woodworking equipment included a Craftsman 6-inch jointer; a DeWalt Model GE all-purpose cut-off saw with a 24-inch-diameter circular blade, and powered by a 5-hp motor; and a Crescent 120-inch heavy-duty band saw.

The forms for the conduit were made from 1 and 2-inch dressed boards running lengthwise, backed by ribs on 12-inch centers. To prevent the boards from cracking, as they were bent to conform to the circular pattern of the tunnel, they were cut with a series of grooves on 1-inch centers across their width. On the 1-inch boards the grooves were ½ inch deep and 1/16 inch wide. For the 2-inch boards the grooves were 1 inch deep and ½ inch wide. Absorptive form lining was stapled to the forms to produce a smooth surface.

Safety first was particularly emphasized in the carpenter shop. Numerous fire extinguishers were placed about for fire prevention. Signs on the wall, vying for attention with a luscious nude on a construction-materials calendar, also stressed the safety angle. One carried the sharp message "Bend down the nails". Another read "Check saw every morning". The latter ritual also included blowing out the motor with compressed air to remove all sawdust which might ignite from a spark.

#### Equipment Maintenance

For maintenance and repair of equipment a 40 x 120-foot Quonset hut was set up near the east abutment as a shop. Inside, it is paved with a concrete floor and illuminated by hanging electric lights. One end is closed off with wire-mesh fencing as a stock room, where parts and supplies are stored on wooden shelves and in bins. Small repairs are done on a wooden workbench which is outfitted with a bench grinder, an 8-inch vise, and air and electric outlets. Compressed air is supplied by an Ingersoll-Rand Type 30 air compressor.

Heavy equipment includes Simplex floor jacks; an Atlas drill press, and a Rodgers 100-ton hydraulic press. Outside are underground tanks containing Gulf diesel fuel and gasoline for the construction machinery.

Every night the equipment was brought to the east side of the job site to be lubricated on a Graco Convoy Luber outfitted with 5 hose reels—2 for chassis lubricant, 1 for gear lubricant, 1 for hypoid "lube" and 1 for air. Ale-

mite grease guns were also used in the lubrication. A Lincoln 300-amp electric welder repaired any structural breakdowns.

#### Quantities and Personnel

Some of the major items included in the dam construction contract are the following:

Stripping	34,000 cu. yds.
Removing unsuitable foundation material	81,000 cu. yds.
Common excavation	275,000 cu. yds.
Borrow excavation	415,000 cu. yds.
Rock excavation	94,000 cu. yds.
Embankment	592,000 cu. yds.
Rock fill	69,000 cu. yds.
Dumped riprap	38,000 cu. yds.
Rock paving	1,500 cu. yds.
Placing gravel backing	24,200 cu. yds.
Concrete	9,500 cu. yds.
Steel reinforcement	495,000 lbs.
Structural steel	39,500 lbs.

The S. J. Groves & Sons Co. of Minneapolis, Minn., is represented on the contract by Fran H. Hiestand, Project Manager; George Webb, Project Engineer; Jack A. Conway, Superintendent on the embankment; J. E. Potter, Superintendent on the rock work; H. A. Dauphin, Superintendent on the concrete, and E. H. Smith, Master Mechan-



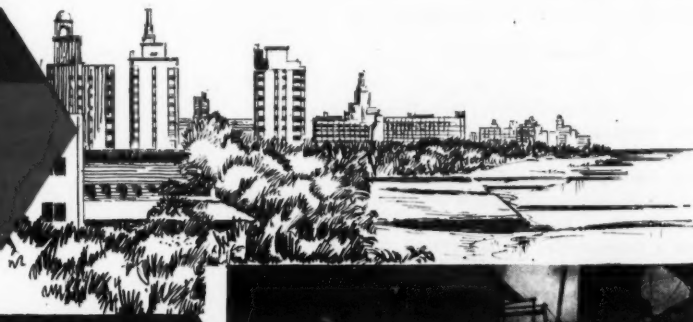
C. & E. M. Photo  
In the carpenter shop at Onondaga Dam, a DeWalt Model GE cut-off saw works at a 45-degree angle on forms for the concrete conduit.

ic. The working force has averaged 125. Lt. Colonel Charles W. Reilly, as Project Engineer, is in charge of the

project for the Corps of Engineers, assisted by J. J. Klein, Resident Engineer. (Concluded on next page)

## The JOB . . .

Producing 400 cu. yds. of aggregate per hour for building southern Florida



## The EQUIPMENT...

2 CEDARAPIDS HAMMERMILLS



## The PRODUCER . . .

Maule Industries, Inc.  
Miami Beach, Florida

To supply an ever-growing demand for paving aggregates, ready-mixed concrete, concrete blocks, precast joists and a wide variety of special concrete products, Maule Industries, Inc. built one of the South's outstanding aggregate producing plants. All of the secondary crushing is handled by two Cedarapids hammermills which reduce oversize oolitic limestone to the desired fine sizes.

Cedarapids hammermills will produce either crushed aggregates of various sizes, dust and agstone or a percentage of both, depending upon the setting of the grates. They will produce not only a much finer quality and uniform size of material, but size-for-size will turn out more tons per hour than other similar types of pulverizing equipment.

When buying aggregate producing equipment, follow the lead of producers who know and buy the best—buy Cedarapids.

Cedarapids

Built by IOWA

THE IOWA LINE of Material Handling Equipment Includes:

ROCK AND GRAVEL CRUSHERS  
BELT CONVEYORS—STEEL BINS  
BUCKET ELEVATORS  
VIBRATOR AND REVOLVING SCREENS  
FEEDERS—TRAPS  
STRAIGHT LINE ROCK AND GRAVEL PLANTS  
PORTABLE POWER CONVEYORS  
PORTABLE STONE PLANTS  
PORTABLE GRAVEL PLANTS  
REDUCTION CRUSHERS  
BATCH TYPE ASPHALT PLANTS  
DRAG SCRAPER TANKS  
WASHING PLANTS  
TRACTOR-CRUSHER PLANTS  
STEEL TRUCKS AND TRAILERS  
KUBIT IMPACT BREAKERS

PRODUCT OF

IOWA

IOWA MANUFACTURING CO. Cedar Rapids, Iowa, U.S.A.



## Rolled-Earth Dam Will Control Floods

(Continued from preceding page)

The flood-control project is under the supervision of Colonel Herbert D. Vogel, Buffalo District Engineer. The Great Lakes Division, which exercises general control over this and other projects within its territory, is headed by Colonel D. O. Elliott, Division Engineer.

J. Frank O'Marah, Director of the New York State Department of Public Works, Bureau of Rights of Way and Claims, conducted the negotiations with the Onondaga Nation for the acquisition of the Indian lands.

Included among State participation items in connection with the construction of the dam and reservoir are: relocation of 5,000 feet of 20-inch brine line; possible relocation of 3,000 feet of a 12-inch brine line; relocation of State Route 11-A to higher ground above the reservoir area; waterproofing and anchoring of 1,200 feet of oil lines; relocation of power and gas lines; and relocation of 2 miles of telephone line.

### Future Contract

The future channel improvement consists of widening and realigning the creek beginning at about Ballantyne Road for a distance of approximately 10,100 feet to Dorwin Avenue at the city limits, and constructing low levees along both banks. The new channel will have a trapezoidal cross section with a bottom width of 94 feet, and a capacity of 6,000 cubic feet per second. Also included are six drainage structures, a weir with concrete training walls at Dorwin Avenue, a foot bridge, and two new highway bridges. The bridges will be constructed by local interests.

### Guide to Belt Selection

A catalog section designed to serve as a guide in selecting the proper grade of conveyor belt for a particular job has been issued by The B. F. Goodrich Co., Akron, Ohio. Section No. 2220 explains how belts are customarily graded—according to the tensile strength of the rubber cover and the friction required to separate adjacent plies. It then goes on to explain that there are other important factors in determining the value of a belt, and it lists these for several grades of Goodrich belts.

The belts described are the Super Longlife, the Longlife, the Hot Material, the Maxecon, and the Oil Proof. Also listed are several special constructions—reinforced cover, stepped plies, breaker fabric, skim coats, Griptop, bare duck, and the Transcord breaker.

The catalog describes these various conveyor belts and cites applications for each. It points out the principal advantages of each, and explains how these adapt to special uses.

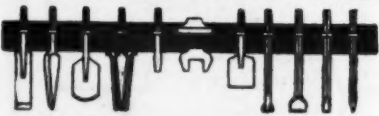
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 60.

### Kennametal Sales Engineer

M. F. Bottomlee has been appointed Sales and Service Engineer for the Rocky Mountain territory of Kennametal, Inc., Latrobe, Pa.

"BICKNELL BETTER BUILT"

## PAVING BREAKER TOOLS



We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

Write for descriptive circular

**BICKNELL MANUFACTURING CO.**

12 LIME STREET ROCKLAND, MAINE



Here is the Speed-King truck-mixer, designed to fit on any 1½-ton short-wheelbase truck chassis. At the right are the Willard portable conveyor and weigh batcher.

### Truck-Mixer Body Fits 1½-Ton Trucks

A truck-mixer designed to fit on any 1½-ton short-wheelbase truck chassis is manufactured by the Willard Concrete Machinery Co., Ltd., 2906 Imperial Hi-Way, Lynwood, Calif. Power for the Willard Speed-King is obtained from a power take-off mounted on the truck.

It is transmitted by a roller chain drive. The mixer has a 2½-cubic-yard capacity.

The Speed-King has no door, hatch, or gate—discharge is controlled by the mixer blades and direction of rotation of the mixer. Total height of the unit when mounted on a truck is about 8 feet. The drum can be controlled from either the cab or the rear of the truck.

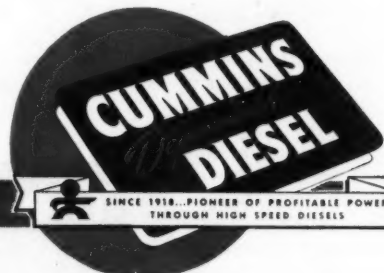
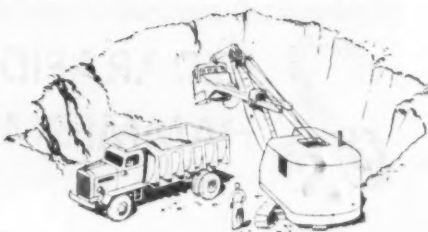
The Speed-King has a pressure water tank with a capacity of 40 gallons. It is furnished with 9 feet of chute of the one-man quick-discharging type.

Other equipment made by Willard includes a 2-yard weigh batcher and a portable conveyor. These are designed to operate independently or in conjunction with the mixer. When they are used with the mixer, the batcher weighs the material and dumps it onto the conveyor belt, which then lifts it into the mixer.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 44.

### Wenzel Research Director

William N. Kelley has been appointed Technical Director by the H. Wenzel Tent & Duck Co., St. Louis, Mo. Mr. Kelley will be in charge of research on waterproofing and canvas processing. Prior to his association with Wenzel, he had been with the Monsanto Chemical Co.



## Big Loads... Fast Work Cycles

Power and more power . . . the kind you need to move more material . . . the kind that means faster swings and dumps for your shovels . . . quicker trips for your trucks.

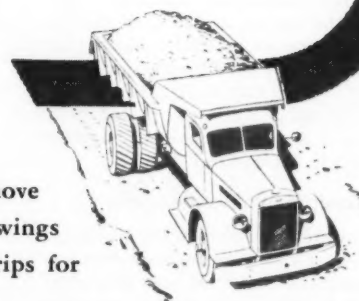
This plus-power of the Series NH-600 (200 hp, max.)

and NHS-600 Supercharged (275 hp, max.) Cummins

Dependable Diesels results in big loads, fast work

cycles, more work from your heavy-duty equipment.

Ask your Cummins Dealer to study your power problems with you . . . see why "more power" will mean "more profit" on your job.



**CUMMINS ENGINE COMPANY, INC.**  
COLUMBUS, INDIANA

## Spalled Bridge Piers Protected With Iron

Concrete piles which had been badly spalled by salt-water tidal action, and by alternate freezing and thawing, were recently repaired with wrought-iron protective boots. These piles support two bridges in Massachusetts. One is the Narrows Bridge on U. S. Route 6 near Wareham; and the other, the Bass River Bridge on State Route 28 near South Yarmouth.

The protective boots for the 90 piles involved were fabricated from 1/4-inch wrought-iron plates, bolted together to form a 22 x 22-inch shield. After installation—at low tide—they were filled with concrete. The wrought iron was furnished by the A. M. Byers Co. of Pittsburgh, Pa.

According to Byers, these wrought-iron plates will withstand sustained submergence in salt water and alternating wet and dry conditions. It is also claimed that scaling and painting of the plate is unnecessary, unless desired for appearance. In fact, Byers states, the scale which generally forms on the surface of plates used for this type of service actually prolongs their useful life if left undisturbed, because it acts as a barrier to corrosion.

Installation of these boots can be accomplished by bolting formed sections together, or by using cinch anchors for attaching to flat surfaces, before filling with concrete. On new construction, in the case of piers or ice breakers, the plates can serve in the place of forms for the concrete, and thus eliminate the necessity of building wood forms.

## Cabs for Tractors

Cabs for use with tractors and other construction equipment are made by Allen Industrial Products, Inc., Battle Creek, Mich. They are available in many styles and models to fit a wide range of equipment.

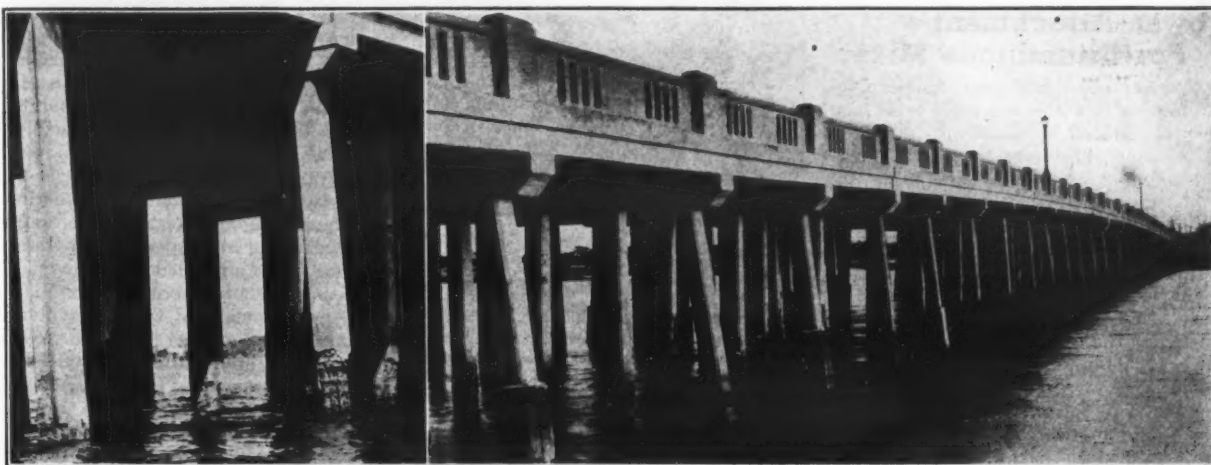
The Model No. HW-47 Allen cab is designed for attachment to Minneapolis-Moline Model UTI or RTI tractors; another model is made for attachment on the Case SI, VAI, or VAIW tractors; the Model DT-11 is demountable and has removable side and rear curtains. Late model Lull loaders are designed for use with these cabs. Allen cabs are also built for Clark Equipment, Ross Carrier, International Harvester, and Oliver tractors, and Warner & Swasey's Gradall.

The Allen cabs feature all-steel construction and shatterproof-glass windshields. The windshield is set in rubber and is equipped with an electric wiper. The models for use with overhead equipment have Plexiglas top windows for increased visibility.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 16.

## Radial-Power-Saw Bulletin

Literature covering its line of radial power saws can be obtained from the Consolidated Machinery & Supply Co., Ltd., 2029 Santa Fe Ave., Los Angeles, Calif. These saws are made in models to handle all cutting operations. They include the Comet Clipper, Senior, Junior, Senior 8, the Comet timber-cutting



These "before and after" views of the Bass River Bridge near South Yarmouth, Mass., show the precast concrete piles badly spalled from salt-water tidal action; and then the protective boots of 1/4-inch wrought-iron plates which were bolted together around the piles and filled with concrete. A. M. Byers Co. furnished the wrought iron.

saw, and a special trailer-mounted saw and generator combination.

The literature describes each of these

in detail. Photographs illustrate each particular model, and text points out its special features. The capacities and rec-

ommended uses of each are listed, and a table of specifications gives comparative readings for the complete line.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 69.

# Proven Facts

## CARSET JACKBITS

- Drill Faster
- Save Powder
- Boost Tonnage
- Reduce Maintenance
- Wear Longer
- Rotate Freely

EXCLUSIVE  
Ingersoll-Rand



## Features

Carset Bits are field proven . . . . From Maine to Texas, from Washington to Alabama . . . . Carset Bits are working, shift after shift, in hard rock and in soft, on Dams, Quarries, Tunnels and in Mines . . . . Everywhere its the same story . . . faster drilling, deeper roads, longer feeds, lower costs. In ground where steel bits are drilling two to ten feet per bit usage, Ingersoll-Rand Carset Jackbits are averaging two hundred to more than a thousand feet. They are the talk of the Industry.

Buy Ingersoll-Rand Carset Jackbits with confidence, team them up properly with the correct Ingersoll-Rand Drifters, Stoppers, Jackhammers and Wagon Drills for highest overall efficiency. They are designed, built, sold and serviced by men who know rock drilling.

# Ingersoll-Rand

For Over 70 Years  
Builders of Fine  
**WHEEL BARROWS:**  
**AMERICAN**  
STEEL SCRAPER CO.  
Sidney, Ohio

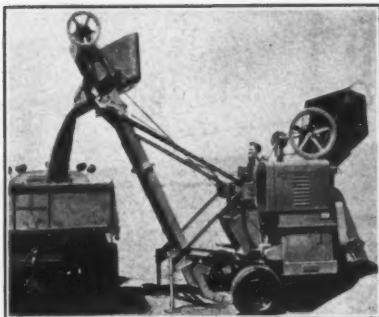


## Tower Attachment For Bituminous Mixer

A tower attachment for discharging bituminous mix above ground level has been introduced by the Kwik-Mix Co., a Koehring subsidiary located in Port Washington, Wis. It is adaptable to either a 10 or 14-cubic-foot standard bituminous mixer. Discharge height for the 10-foot model is 7¾ feet, and 8¾ feet for the 14-foot model.

The loader is operated by a special hoist, controlled by a single lever located on the operator's platform. The hoist is mounted within the mixer frame, and is powered by the mixer engine. The hoist clutch is said to disengage automatically when the bucket reaches the discharge position. The tower is designed to be collapsed quickly and positioned for ample road clearance in moving the machine from one location to another.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 37.



This new Kwik-Mix tower attachment discharges bituminous mix above ground level. It is adaptable to a 10 or 14-cubic-foot standard bituminous mixer.

## Details on Large Tractor Unfolded in Picture Story

A 24-page full-color catalog giving complete details on the TD-24 crawler tractor is now being distributed by the International Harvester Co., Industrial Power Division, 180 N. Michigan Ave., Chicago 1, Ill. Designated by the com-

pany as Form No. A-34-LL, the book has a 4-color cover which features both the TD-24 and the Planet Power steering. The catalog uses the picture-story technique to present the information on the tractor. It includes over fifty sectional views, line drawings, and photographs.

The hydraulically controlled steering system is graphically illustrated and described. The high-speed track frame assembly is dismantled step by step, by means of photographs and text matter. And the starting system is given similar treatment, as are the foot-operated hydraulic clutch, the synchromesh transmission, the forward-reverse shifting lever, and the Planet Power final drive.

The catalog also describes the 180-hp diesel power unit, the pressure-lubricated transmission and final-drive bearings, the durable frame construction, and the chassis features. It lists all the attachments available for the tractor, and its complete specifications.

Copies of this literature may be

obtained from the company. Or use the enclosed Request Card. Circle No. 80.

## Raybestos Advances Teeling

R. F. Teeling has been appointed Manager of the North Jersey Branch sales office by Raybestos-Manhattan, Inc., Manhattan Rubber Division. This branch, located in Passaic, was formerly known as New Jersey Sales.

## Black-top mixing plant



by **STANDARD**

STANDARD is one of the oldest and largest builders of paving plants—seven sizes to meet all conditions. Used throughout the world. Modern. Unit-built, easy to erect and transport.

Write for Catalog

## STANDARD STEEL CORPORATION

5001 Boyle Avenue

LOS ANGELES - CALIFORNIA

## The Slower Movement of Gears in Eaton Planetary Design Means Quiet Operation, Minimum Wear

In the Eaton exclusive planetary construction the "planet gears," when transmitting power in the low speed range, turn over at very slow speed. They are locked out completely when the axle is operating in the high speed range. This means quiet operation, minimum wear, and longer axle life. Outstanding performance records are proof of Eaton quality and design. See your truck dealer for complete information about Eaton 2-Speed Truck Axles.



**EATON** 2-Speed  
Truck  
**AXLES**

ALMOST A MILLION EATON 2-SPEED AXLES IN TRUCKS TODAY

**EATON MANUFACTURING COMPANY**

*Axle Division*

CLEVELAND, OHIO



Available on  
skids, steel wheels  
or pneumatic  
tires.

A complete line of sizes from 1½" to 10". Also 3" and 4" Diaphragm Pumps. See the nearest CMC Distributor or write for catalog.

CONSTRUCTION MACHINERY CO'S  
WATERLOO, IOWA

## COMPLETE WELL POINT SYSTEMS

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## Roadside Committees Coordinate Activities

### Plan of Coordinating Committee for Work of HRB and AASHO Groups Set in Motion at Recent Meeting

A MEETING of the Executive Coordinating Committee of the Highway Research Board and American Association of State Highway Officials Roadside Development Committees was held recently to plan a program for coordinating the activities of these two groups. This plan for coordinating the work of the two committees was set up prior to the war. During the war years, it was dormant; now it has been set in motion again.

Under this plan, the scope of the two committees has been definitely defined. The HRB committee will devote its effort to research in various phases of roadside development, while the AASHO committee is concerned with administrative problems. Under the co-chairmanship of Harold J. Neale, Landscape Engineer of the Virginia Department of Highways, and John L. Wright, Director of Roadside Development, Connecticut State Highway Department, the Executive Coordinating Committee has been set up. The country has been divided into regions corresponding to the Public Roads Administration divisions, and for each a "coordinator" has been appointed by the committee.

#### How the Plan Works

All questionnaires, reports, and requests for data from the various subcommittees of both the HRB and AASHO committees—where the reports and requests involve the entire country—are supposed to be cleared through the Secretary of the Coordinating Committee by the chairman of the project or standing committee. They are then sent to the coordinators. This procedure will eliminate duplication of effort to a large degree. It will allow coordinators to handle several requests or questionnaires at the same time when they correspond with the landscape engineers in their divisions.

Where the data or questionnaires are important enough to justify discussion, the coordinator usually arranges a division meeting. At this meeting, representatives of the different states in the region, together with representatives of the PRA, can discuss the subjects as they pertain to that particular division. The coordinator then makes a compilation of the subjects discussed and turns it over to the Secretary.

Through this procedure it has been possible in the past to obtain practically 100 per cent coverage of the country; on the other hand, contacts directed by committee chairmen to different states have often furnished only a small percentage of reports.

#### Projects for 1948

Taking advantage of the presence of a number of coordinators at the Seventh Annual Short Course on Roadside Development in Columbus, Co-Chairman Neale called a meeting of the committee, and invited other landscape engineers present to attend. It was suggested that the first project for 1948 be to call meetings of all highway engineers in the various regions, to discuss the highway program and how roadside development can contribute to the solution of many construction and maintenance problems. Emphasis should be placed, it was agreed, on the role of landscape operations in the development of the "complete highway". Such meetings should also provide suggested subjects for the study by the HRB and AASHO committees and subcommittees.

#### Committee

Members of this Executive Coordinating Committee include, in addition to Co-Chairmen Wright and Neale: Wilbur R. Simonson, Head, Roadside Development Section, Public Roads Administration, as Secretary; Frank H. Brant, Landscape Engineer, North Carolina State Highway and Public Works Commission, representing the Highway Research Board; and Dallas D. Dupré, Jr., Landscape Architect, Ohio Department of Highways, as AASHO representative.

#### Coordinators, Divisions

The coordinators are: Division 1, John S. McManmon, Landscape Engineer, Massachusetts Department of Public Works; Division 2, Wesley L.

Hottenstein, Supervisor of Highway Forestry, Pennsylvania Department of Highways; Division 3, J. A. Kennedy, Road Design Engineer, Georgia State Highway Department; Division 4, E. C. Eckert, Chief Forester, Michigan State Highway Department; Division 5 North, H. E. Olson, Engineer of Roadside Development, Minnesota Department of Highways; Division 5 South, Franklin T. Rose, Landscape Architect, Kansas State Highway Commission; Division 6, Torbert Slack, Landscape Architect, Louisiana Department of Highways; Division 7, H. Dana Bowers, Landscape Engineer, California Division of Highways; Division 8, Mark G. Astrup, Assistant Superintendent of Parks, Oregon State Highway Commission; Division 9, Charles E. Shumate, Division Superin-

tendent, Colorado State Highway Department.

The divisions are as follows: Division 1, the New England states, New York, and New Jersey; Division 2, Delaware, Maryland, Ohio, Pennsylvania, District of Columbia, Virginia, and West Virginia; Division 3, Alabama, Florida, Georgia, Mississippi, Tennessee, North and South Carolina; Division 4, Illinois, Indiana, Kentucky, and Michigan; Division 5 North, Minnesota, North and South Dakota, and Wisconsin; Division 5 South, Iowa, Kansas, Missouri, and Nebraska; Division 6, Arkansas, Louisiana, Oklahoma, and Texas; Division 7, Arizona, California and Nevada; Division 8, Montana, Oregon, Idaho, and Washington; and Division 9, Colorado, New Mexico, Wyoming, and Utah.

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The "new look" in truck mixers—the Blaw-Knox HI-BOY—has a built-in Revolving Hopper that reduces your charging time 50%. Its discharge elevation is higher without adding over-all height to the mixer.

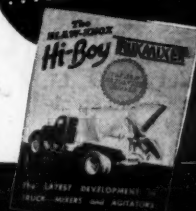
That tight-seal revolving hopper—and many other exclusive and practical features—has been job-proved by hard work on many projects. One contractor produced 80,000 cu. yds. with ten HI-BOYS in four months—with nary a leak in the seal or major trouble of any kind.

The Blaw-Knox HI-BOY is really a concrete producer—both in quality and quantity—it's the truck mixer you have been waiting for.

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# Highway Problems Posed at Meeting

## 9th Annual Engineering Meeting at University Of Utah Features Latest Design Difficulties

♦ SOLUTIONS to some of the hardest problems currently faced by highway designers and builders were proposed at Salt Lake City recently by top-flight engineers from 15 states. The occasion for the discussions was the Ninth Annual Highway Engineering Conference at the University of Utah, with which was combined a conference on bituminous construction and materials, sponsored by the Highway Research Board.

More than 300 delegates registered for the 5-day convention, which was held in the University's Union Building from March 1-5.

Soils, drainage, compaction, equipment, design, construction, and maintenance were some of the featured subjects. One of the toughest practical problems which designers and road builders face today was pointed out forcibly from the floor during a discussion period by Roy W. Crum, Director of the Highway Research Board.

"The time has come when you research engineers are going to have to treat water as a construction material, and to figure it, for ill or good, in your designs. The bad effects of natural moisture under pavements of all kinds are too well known to neglect further study. We need research, extensive research, to determine much more accurately the destructive characteristics of water."

The conference was planned by Prof. A. Diefendorf, Head of the Department of Civil Engineering, to bring the delegates up to date on the current problems and practices of all phases of highway engineering, including traffic safety.

### Soils Are Discussed

K. B. Woods of Purdue University, and Associate Director of the Indiana Joint Highway Research Project, told the delegates that highway builders will always have road failures if they do not take soil conditions into consideration more carefully.

Mr. Woods stressed the value of aerial photographic surveys in locating and cataloging soils. With a series of slides he showed road defects and contour systems gathered from all over the United States and Alaska. He pointed out that different materials photograph differently, and leave varying patterns of light. He likened the system to a fingerprint type of soil identification.

"These patterns, however, may vary under different climatic conditions", Mr. Woods said. "Limestone, coastal-plain material, or any soil conditions may photograph differently in Alaska than they do in the United States."

The compaction of soils was discussed in a paper presented by Charles W. Allen, Research Engineer of the Ohio Department of Highways. Special soil conditions were covered by Professor R. L. Sloane of the University of Utah.

D. J. Steele, of the Public Roads Administration of Washington, D. C., gave the delegates a talk on the stabilization of soils. The effects of climate and frost on soils were discussed by A. W. Johnson, Soils and Foundation Engineer of the Highway Research Board.

Mr. Johnson, who spoke on a subject uppermost in the minds of most of the delegates, said that with a change in

the volume of a soil there usually comes a change in its supporting value. Further, he pointed out, the swelling value of soils varies a great deal, and the freezing temperature of a soil is related directly to its particle sizes. Johnson also suggested that some soils, especially heavy clays, can be over-compacted under highway pavements—to a point where failure due to frost action is accelerated.

### Bituminous Problems

Bituminous materials and problems, too, came under discussion. Bituminous mixtures generally were analyzed and discussed by F. N. Hveem, Staff Ma-

terials and Research Engineer of the California Division of Highways. Failures of this type of pavement were described visually with the aid of a chart.

The primary causes of bituminous-pavement failure, he said, are disintegration and instability. Secondary causes of disintegration are the hardening of the asphalt film on aggregates, insufficient asphalt, and water action. The secondary causes of instability are low friction between particles, and low cohesion of asphalt.

Hveem said that California has now standardized on a grading curve for aggregates. Light oils, he said, are gen-

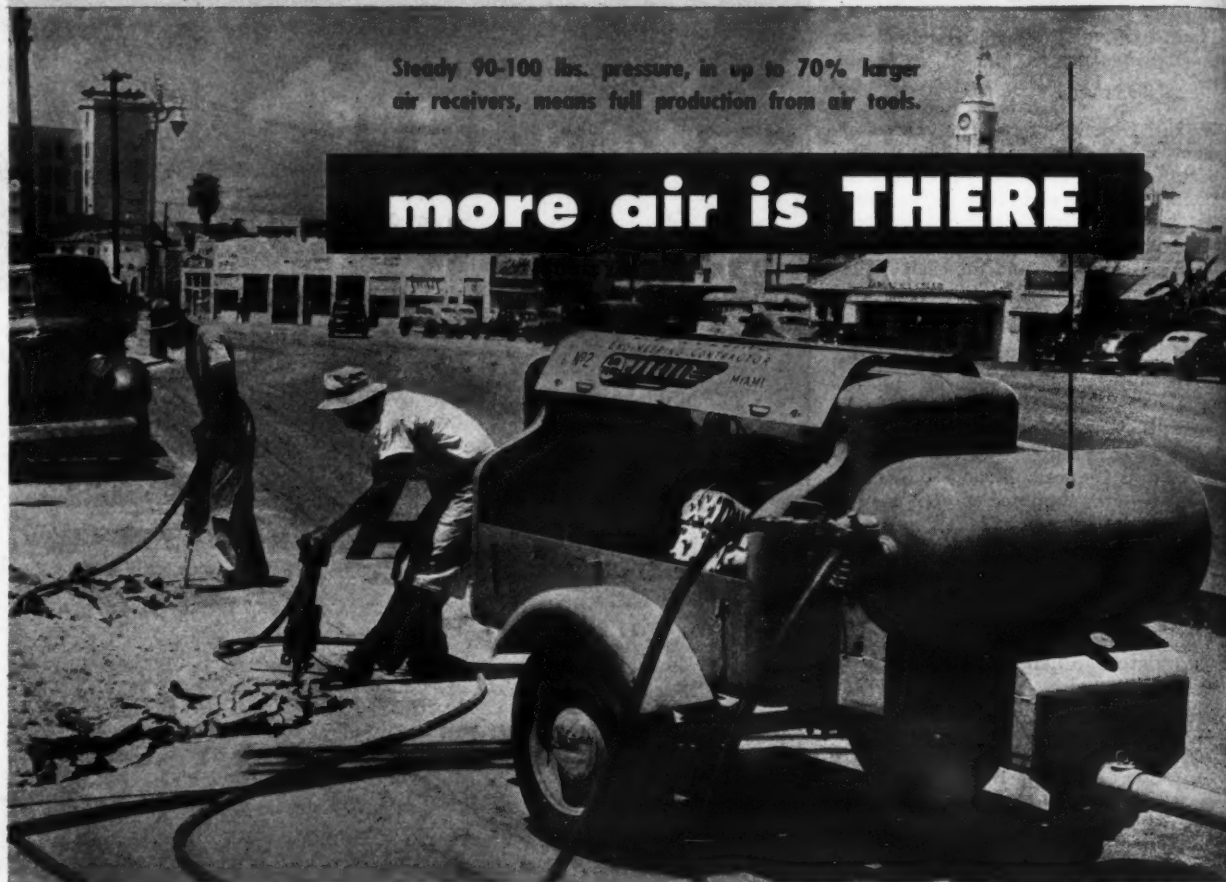
erally better for fine soils, while the heavier asphalts and tars are better suited to more granular material with a low surface area.

Bituminous materials, too, were fully discussed by Bailey Tremper, Materials and Research Engineer of the Washington Department of Highways. Mr. Tremper told the delegates that asphalt was first used in 3,800 B.C., and that the Incas of Peru used asphalt for the construction of roads in the year 1,500 A.D.

The four main properties of asphalt, Tremper said, are consistency, durability, rate of curing, and resistance to

(Concluded on next page)

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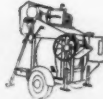
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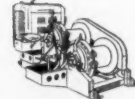
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water. He advised the delegates that the No. 1 need in highway laboratories at this time is some artificial method for aging bituminous samples at an accelerated pace. A new method of measuring the adhesive qualities of asphalt is also needed, he said, since the stripping of aggregates and asphalt in the presence of moisture is most important.

While additives generally improve adhesive qualities of asphalt in the presence of moisture, Tremper said that they should not be used indiscriminately, because of the cost factor.

Cross-section design and drainage problems in connection with highways

were discussed by Professor Diefendorf, who also organized and directed the Highway Engineering Conferences from the time of their inception. Professor Diefendorf called for wider right-of-ways, and stressed the need for better drainage plans.

The design of flexible drainage structures was treated by G. E. Shafer, Chief Engineer of Armco Drainage & Metal Products, Inc. Recent changes in the design of corrugated and Multi Plate culvert pipes, he said, have made available a high-strength water conductor which will give more years of life under heavier conditions of loading.

W. M. Parrish, Assistant General

Sales Manager for the International Harvester Co., told the assembled delegates about the use of industrial diesel power units on highway construction equipment. A movie was shown to illustrate the extensive research and improvement behind International diesel-engine development—the theme of Mr. Parrish's talk.

Some of the scenes in the film showed actual explosions inside diesel test cylinders, and illustrated various types of combustion from good to bad. These scenes were filmed with the aid of a special Eastman camera which operated at 2,800 frames per second, exposing 50 feet of film in 0.8 second.

### PRA Participates in Talks

The Public Roads Administration, too, participated in the talks, sending some of its most widely known men to the meeting. Dr. L. I. Hewes, Chief of the Western Region of PRA, discussed construction in the eleven western states. He suggested that the saturation point had been reached in contracting beyond which competition would decline among contractors. Recent PRA figures were cited which show a cost-index increase of from minus 80 in 1940 to plus 140 in 1948; the year 1927 was taken to represent 100.

One of the most complete discussions of the entire meeting was concerned with maintenance and maintenance equipment. It was given by J. S. Bright, Deputy Commissioner of the Public Roads Administration from Washington, D.C. Mr. Bright's paper traced the evolution of highway maintenance from its beginning to the present date and is presented at greater length on page 23 of this issue.

The featured speaker at the annual banquet was Hal Hale, Executive Secretary of the American Association of State Highway Officials. Mr. Hale gave an illustrated lecture on the Inter-American Highway from the United States through Central America to Panama.

### Joint Board Established By Contractors and Union

The National Joint Board for the Settlement of Jurisdictional Disputes became effective May 1. It was formed by members of the Building and Construction Trades Department of the American Federation of Labor, The Associated General Contractors of America, Inc., and seven national associations of specialty contractors. Named as impartial Chairman is John T. Dunlop. Mr. Dunlop is an Associate Professor at Harvard University, and consultant to the National Labor Relations Board and to the Council of Economic Advisers.

The Board will handle jurisdictional disputes brought to it by participating groups, or by contractors or associations in the industry who sign a stipulation to be bound by the terms and provisions of the agreement.

Associations of employers and the union group will undertake to encourage employers in the construction industry to make use of the facilities of the National Joint Board. Participation is limited to those employing members of the unions affiliated with the Building and Construction Trades Department.

### Guide to Line of Screens

A catalog called "A Guide to Better Screening" has been put out by the Seco Equipment Co., Inc., 1754 Walden Ave., Buffalo 21, N. Y. The complete line of the Seco vibrating screens produced by this company is represented in the catalog. The information contained is classified according to the major uses to which the Seco screens are adapted—crushed stone, sand and gravel, black-top aggregate, etc.

A feature of all Seco screens is the patented equalizer assembly, and this is described in detail. Introductory text explains that Seco control brings about accurate screening, maximum capacity, and long life. A section of the catalog deals with the various screen cloth mountings available, while another section gives instructions on the installation and care of the screens.

The Seco line consists of over 250 models designed for use with fine, coarse, light, or heavy materials. Photographs of typical models illustrate the complete line, and other photographs show field installations where Seco screens are being used.

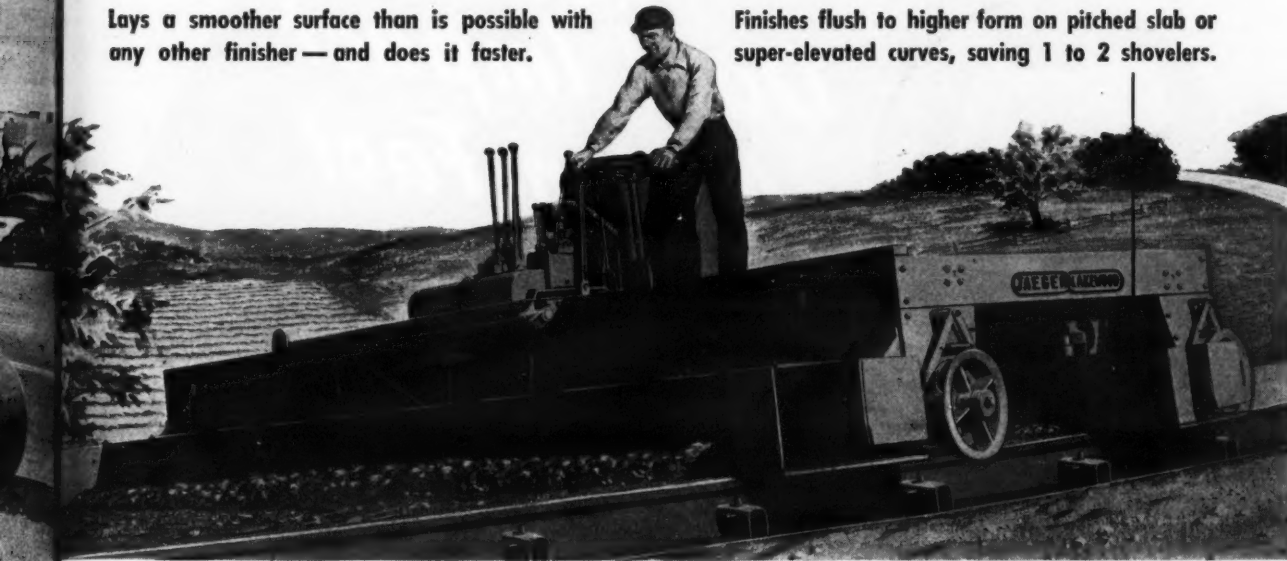
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 72.

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Lays a smoother surface than is possible with any other finisher — and does it faster.

Finishes flush to higher form on pitched slab or super-elevated curves, saving 1 to 2 shovelers.



The Type "X" Diagonal Screed Finisher, designed and patented by Jaeger, provides a basic improvement in finishing concrete pavements.

Where slab is pitched or super-elevated, you simply set the rear screed at whatever angle is needed to carry material uphill and compact it solidly against the higher form. No other finisher can do this.

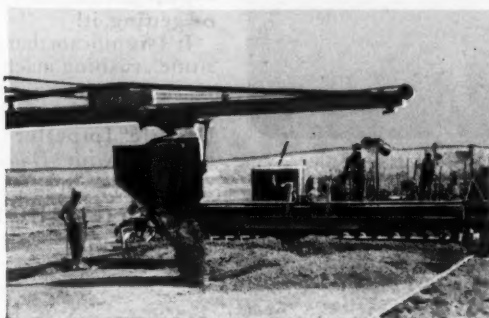
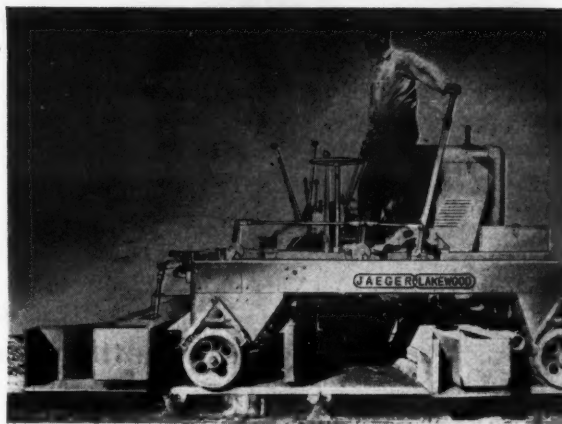
Because the rear screed operates diagonally to the transverse front screed, it acts to average out irregularities left by the front screed, insuring a smoother surface and reducing hand work and equipment behind the finisher. Stiff mixes, worked at an angle by the final screed, can be finished faster without heaving. A wide range of screed speeds, all independent of action, provides flexibility and finishing capacity to match the biggest dual drum pavers built today.

### Re-mixing, compacting spreader gives you a mass-production "team"

Important new improvements in Jaeger 1948 model Concrete Spreaders provide capacity and flexibility never before available to work with the Type "X" Diagonal Screed Finisher. One Spreader and one Finisher operator can spread, strike-off and smoothly finish the enormous output of two 34E dual drum pavers. Makes today's road builder an efficient mass-producer of square yards of pavement, at lower and more accurately pre-determined cost per yard.

No other spreading method provides the re-mixing and compacting action of the Jaeger spreading screw which positively eliminates segregation and resulting honeycomb and produces a denser, more uniform pavement as proved by numerous core tests.

Wide, oscillating strike-off can be furnished if desired, for striking off concrete or for spreading and finishing bituminous material.



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### Mechanical Pencil For Draftsman's Use

A mechanical pencil for use by draftsmen is manufactured by the Listo Pencil Corp., Alameda, Calif. It is designed to permit the draftsman full vision of the pencil point at all times. Leads are available in six degrees of hardness—F, H, 2H, 3H, 4H, and 5H. And to indicate which of these leads is being used, the Listo pencil comes with different-colored tops.

Leads are propelled through a spring tension point designed to keep them from turning, wobbling, or slipping. This point also holds the lead tight at the point of writing. New leads are inserted by unscrewing the point and placing the lead in it.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 46.

### Concrete Vibrators

A line of concrete-vibrating equipment has been introduced by the Vibro-Plus Corp., 243 W. 55th St., New York 19, N. Y. It includes electrically-operated external vibrators, and internal vibrators which can be driven by gasoline, electric, or pneumatic power.

The Model ERSB vibrating spade is driven by a 1-hp motor designed for a 110/220-volt single-phase 60-cycle ac circuit. The pneumatic type of spade, Model LRSB, uses a 1-hp power unit operating at an air pressure of about 85 psi. It uses from 18 to 39 cubic feet of air per minute, measured at atmospheric pressures. Specifications for all of these vibrating spades are the same except for the type of power used. The Model 70 tube has a 2 3/4-inch diameter, a length of 27 1/2 inches, and a frequency of 9,000 vibrations per minute. The Model No. 55 has a 2 3/16-inch diameter, a length of 19 3/4 inches, and is rated at 13,000 vibrations per minute.

The Model ER vibrator is a completely enclosed self-contained vibrating unit provided with a built-in motor. It is supplied complete with a fastening bolt or a locking lever, and a steel bracket, so that it can be attached to the object to be vibrated. The standard vibrator has 10 feet of flexible cable, and a plug which is enclosed in a cast-iron casing.

The working frequency of the vibrators is listed at 3,600 impulses per minute. They operate on a 60-cycle 3-phase ac circuit, at 65, 110, or 220 volts.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 41.

### PCA Research Laboratory

A modern research laboratory will be built for the Portland Cement Association. It will contain more than twenty-five specialized laboratories—moist-curing rooms, fog rooms, low-temperature rooms, freezing and thawing rooms, and others. The two buildings which comprise the laboratory will have a total floor area of approximately 98,000 square feet. They will be set on a 15-acre tract in north Skokie, Ill.

### Air-Hose Couplings

A folder on its line of quick-acting air-hose couplings can be obtained from the Kelly Machinery Co., 2524 W. Madison St., Chicago 12, Ill. Features of the couplings stressed in Bulletin No. 62 include dependability, interchangeability of all locking heads, quick action, and airtightness. The Trojon or Duro locking heads are connected or disconnected with less than a quarter turn, the manufacturer explains. Gaskets have flanged portions set in deep-ground finished recesses to give an airtight fit.

The folder illustrates various types of fittings in the line and lists the sizes in which they are available. In addition to the Style TM malleable-iron Trojon and the Style K bronze Duro fittings, items covered in the folder include the Kelly Hy-Way couplings and the O-Kay line of high-pressure-hose fittings.

Copies of this literature may be obtained from the company, or use the enclosed Request Card. Circle No. 52.



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A capacity of 150 T.P.H. of minus 4" stone can be obtained by using smaller sheaves and setting the horizontal and vertical breaker bars at their maximum opening.



The Hi-Lo truck-mixer can be used either as a 3-cubic-yard mixer or as a 4½-yard agitator. It has an open-top stationary drum and features a revolving mixer-blade action.

### Concrete Truck-Mixer

An addition to its line of truck-mixers is announced by the Concrete Transport Mixer Co., 4985 Fyler Ave., St. Louis 9, Mo. The new Hi-Lo mixer has an open-top stationary drum, and features a revolving mixer-blade action. It can be used as a 3-cubic-yard mixer or as a 4½-yard agitator.

The main mixer shaft is a 5-inch cold-rolled seamless tube which has a 1-inch wall thickness. It is supported on a double row of self-aligning roller bearings. Power is obtained from a power take-off or from a separate power unit. It is transmitted to a 2-step 2-speed gear reducer, and thence to the mixer shaft by a chain and sprocket drive. Mixing rates can be varied from 8 to 16 rpm, and agitating speeds from 2 to 6 rpm.

The manufacturer recommends mounting the unit, if it is to be used as a mixer, on a single-axle truck chassis with a 145-inch wheelbase. For agitation service, it should be mounted on a tandem-axle 2 to 3-ton truck chassis.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 12.

### Soil-Stabilization Movie

A new sound-motion picture on the P&H single-pass soil stabilizer has recently been completed by Harnischfeger Corp. It shows P&H stabilizers at work on several soil-bituminous road projects, and presents a full explanation of how the unit shaves and pulverizes native material, blends it, applies liquid, gives a final mix, and spreads to a uniform depth in a single pass. It is printed on 16-mm color film and runs for 22 minutes.

This is the second motion picture to be made about this machine—the first dealing with soil-cement stabilization. Either or both films are available without cost to groups interested in road planning and building. Highway departments, contractors, and others who want to see this new film, or the one on soil-cement stabilization, should write to the company at 4419 W. National Ave., Milwaukee 14, Wis.

### Electric-Plant Bulletin

A new bulletin on its 700-watt electric plants has been issued recently by the Universal Motor Co., 428 Universal Drive, Oshkosh, Wis. It describes and illustrates the 1-cylinder air-cooled gasoline power unit, and also gives



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complete specifications. It outlines many applications for the plant and lists several features claimed for it. The unit is available in either ac or dc models.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 70.

### Industrial Rubber Goods

A line of industrial rubber goods is described in a 16-page catalog issued by the Quaker Rubber Corp., 4641 Comly Ave., Philadelphia 24, Pa. The Quaker line consists of over 9,000 industrial rubber products, including belting, hose of all types, gaskets, couplings and other fittings, packings, and tubing.

The catalog describes each of these items in detail. It points out the type of construction employed in each, and also lists the sizes and styles in which they can be furnished. The booklet is indexed for handy reference.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 95.



This three-level underpass-overpass which the Virginia Department of Highways is building near Norfolk will take U. S. 13 at its top level, U. S. 460 and State Route 116Y on its lower level, and at its center level the main line of the Norfolk & Western Railway plus a connecting highway. The structure will be nearly 50 feet from the lowest to the highest point. Low-level clearance will be 14 feet, while the second level will offer 22.6-foot clearance.

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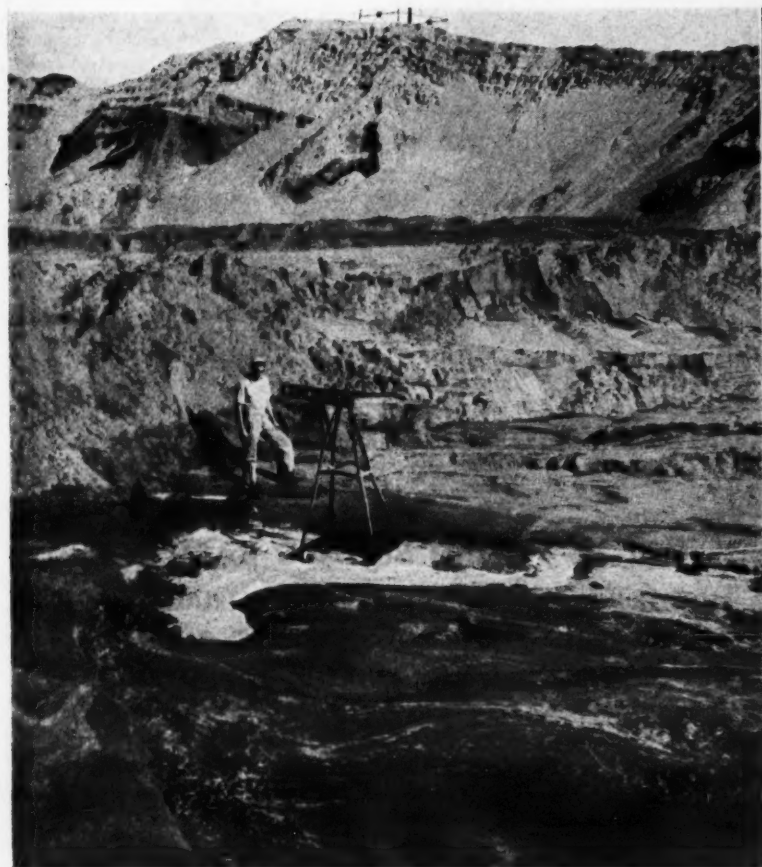




# Hydraulic Sluicing Cuts Away Sand



**THE JOB.** Men with hydraulic monitors are sluicing away a 14,000,000-yard sand dune near El Segundo, Calif. The job will open the way for construction of a new sewage-treatment plant for the City of Los Angeles. And the disposal of all this sand will widen 6 miles of beach along the Pacific, from El Segundo to Santa Monica.



**EDUCTORS.** The sand forms in solution with the discharged water (left) and streams downhill to the suction intakes of the eductors, designed on the principle of the Venturi tube. An intake, seen in close-up above, consists of a steel framework about 3 feet square. Water from 20 and 22-inch pipe lines shoots through a small nozzle into the choked-down tube, creating a partial vacuum which sucks sand and water to the carry-away pipe.



**BOOSTER STATION.** Finally, a booster station with two more 28-inch pumps moves the material farther on to the end of the fill. In this view, you can see the new beach made with sand fill—as well as the American hoist and stiffleg derrick which services the heavy pumps.



**PIPE-LINE HOOK-UP.** This pipe-line hook-up at the booster station permits one or both of the 28-inch pumps to act on the sand solution. Both are driven by 4,000-hp G-E motors, and eventually they will have to move the material nearly 19,000 feet to the end of the fill.

# Sand Dunes

Job for City of Los Angeles  
Features Sensibar Method  
Of Muck Removal by Monitors,  
Venturi-Type Eductors, Pumps

(C. & E. M. and Gareld W. Anderson Photos)

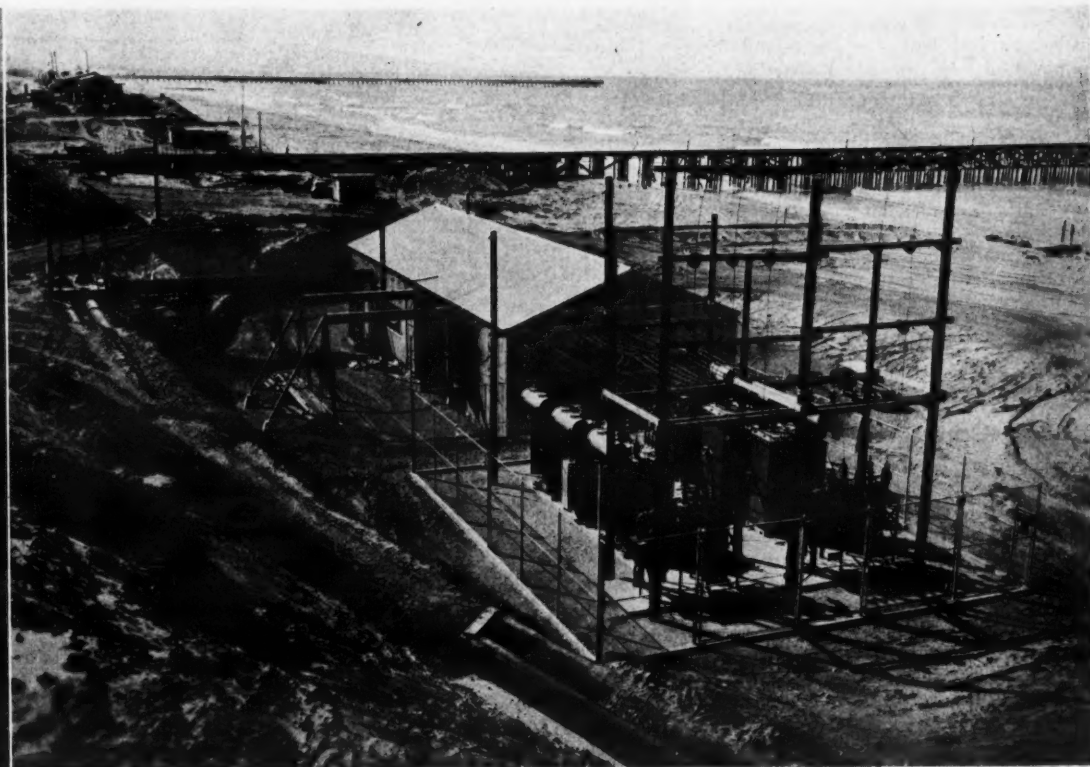
(See article on page 40)

**CONTRACTORS.** Peter Kiewit Sons Co. of Omaha, and Construction Aggregates Corp., of Chicago, are "co-contractors" on the big project, which involves the patented Sensibar method of muck removal. Their joint-venture low bid of \$3,494,088 got the job for the Los Angeles City Dept. of Public Works.

**MONITORS.** These swivel-mounted monitors, with their 3½ to 5-inch-diameter nozzles and 15-foot barrels, cut sand from the dunes with a stream of salt water piped under high pressure from the main pump station. Here the stream is 150 feet long.



**SURGE PIT.** The eductor lines come in over trestles to the surge pit. There about 6,000 yards of sand can be stored on either side of the mixing chamber (center of picture), a steel box with gates to admit sand and water. By regulating sand inflow with proper water supply, the operator sends the optimum load of pay dirt towards the pump station.



**PUMPING STATION.** A 150-foot intake pipe line 30 inches in diameter conducts the sand solution from the mixing chamber to the main pumping station shown above. From there, four 28-inch 4,000-hp centrifugal dredge-type pumps shove the material towards the shore line to build the first 11,000 feet of beach.

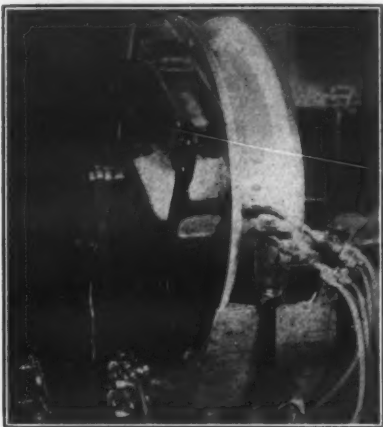


**CONTROL BOARD.** This view taken inside the booster station shows the board from which the power is controlled.



**DISPOSAL DUMP.** After traveling the long pipe line out to the fill, the sand solution is discharged at pressures of from 160 to 170 psi. In this picture, Dump Foreman Virgil Eugg (right) and C. & E. MONTHLY's Western Editor Ray Day (left) discuss all there is to discuss about hydraulic sluicing, while a couple of dump-gang workmen look on.





This special rig was built recently to position and rotate the 3,400-pound lower frame of a power shovel while its roller pads were flame-hardened. The rig also mounted the oxyacetylene torches and accessory equipment.

### Flame-Hardening Rig For Heavy Castings

The problem of hardening the roller pads of a lower-frame casting used on power shovels recently confronted the Columbia Machinery & Engineering Corp., Hamilton, Ohio. Due to the weight and size of the casting, it was found impractical to use existing hardening equipment. However, a special device was rigged up by the company in cooperation with the Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y.

The two companies built a fixture for positioning and rotating the castings and for mounting the oxyacetylene torches and accessory equipment. The 3,400-pound casting was rotated at a speed of 7 inches per minute, and the flame-hardening operation was completed in 25 minutes. Two torches operating simultaneously flame-hardened both the upper and lower faces of the roller rings to a depth of 3/32 inch.

### Data on Concrete Vibrator

A catalog on its line of concrete vibrators is being distributed by the Maginniss Power Tool Co., 129 Distl Ave., Mansfield, Ohio. It features a description of the one-man operation of the Maginniss vibrator, and points out that it can be used at distances of up to 200 feet from the source of power.

Specifications are given for the Model HCV-3 Hi-Lectric vibrator and for

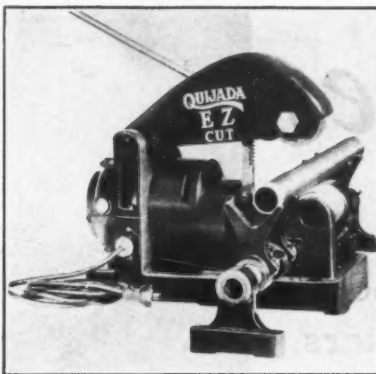
the Model HGG-1 Hi-Lectric gasoline generator which provides power for operating the unit. Also included is a description of the line cables used.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 79.

### Pipe or Tube Cutter

An electric-driven pipe or tube cutter is manufactured by the Quijada Tool Co., Inc., 5474 Alhambra Ave., Los Angeles 32, Calif. Marketed under the trade name E-Z Cut, it features power-driven rollers, automatic stop-start action, and ball-bearing operation throughout. It can be used with pipe ranging in diameter from 3/8 to 4 inches. Power is furnished by an integrally mounted 1/2-hp 110-volt universal-type ac-dc motor.

The power unit is direct-connected to the rollers through a gear drive. The gears are self-lubricating. An automatic trip switch is designed to start the cutting operation as soon as the cutter



The Quijada pipe or tube cutter features power-driven rollers, automatic stop-start action, and ball-bearing operation throughout.

wheel contacts the pipe, and to stop it automatically when the cut is finished. The adjustable roller yokes provide support and permit free rotation of the pipe. The ball-bearing cutter wheel is removable for sharpening.

Further information may be secured

from the company, or by using the enclosed Request Card. Circle No. 22.

### Veterans Hospital Program Shows a Speed-Up in 1948

Notable progress on the construction of hospitals for veterans has been reported by Gen. Raymond A. Wheeler, Chief of the Army Engineers. According to General Wheeler, 23 hospitals are now under contract for construction at a total cost of \$194,253,000. The 1946 and 1947 program was adversely affected by increased costs which made it necessary to redesign practically all hospitals that had not been placed under actual contract.

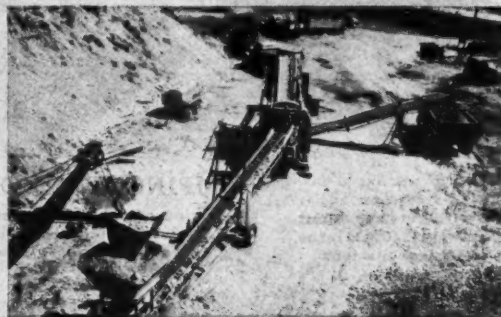
Of the 46 hospitals still in process of design, 40 are far enough along to be scheduled tentatively for advertising this year. Under the present schedule, 3 hospitals will be advertised for bids during the second quarter of 1948; 14 will be offered during the third quarter; and 23 are scheduled for the last quarter of the year.

## Making Little Ones Out of Big Ones

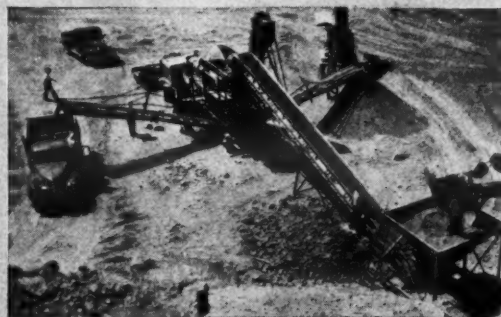
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# Welded Members For Road Bridges

## Method Adopted in Which Members Are Shop-Welded With Field Connections Made by Riveting

By V. KARMALSKY, Design Engineer,  
Department of Main Roads, New South  
Wales, Australia

Since 1935, no riveted bridges have been built in New South Wales, Australia. All bridges built, in construction, or being designed are of welded construction.

This report will discuss a few of these bridges from the standpoint of the economy of three methods of construction proposed—riveted, all-welded, and shop-welded combined with field-riveted. Complete details are available because competitive bids were received on the three types of construction.

### Alternative Designs Prepared

The Department of Main Roads, N. S. W., which is responsible for bridge design and construction, had introduced welding into small works prior to 1935. But it had not attempted the application of welding to bridges. Many engineers felt that although great savings in weight were possible by welding, the unit rates for completed steel work would be much higher than for riveted work. This was due partly to the fact that there was only a limited amount of welding equipment available in the area. It was therefore decided, as a test, to prepare alternative designs for a welded and a riveted truss and to call for bids on both designs. The work selected for this purpose was a 100-foot truss span for the bridge over the Manilla River at Barraba.

It is the Department's policy to prepare full working drawings and then to call for bids to conform to this design. The Department has also developed the practice of designing steel bridges for construction under two contracts: (1) fabrication of the steel work, and (2) actual construction of the bridge, including erection of the steel work. And to insure satisfactory shop work and to obviate difficulties in the field, specifications call for shop erection of all steel work.

In riveted work, correct alignment and matching of holes greatly facilitates the work of the erection contractor; so for the welded truss in the Barraba Bridge, it was decided to make use of a number of fitted bolts in the connections to insure correct alignment and fitting of parts in the field.

The usual method of welding intersection joints was found impractical, as the members were fully stressed. The use of such joints would cause local stresses in the through members between the points of intersection of the gravity axes and the points of actual junction with the inclined members, even when gravity axes were concurrent. It was therefore decided to use gussets for most of the joints to avoid these stresses.

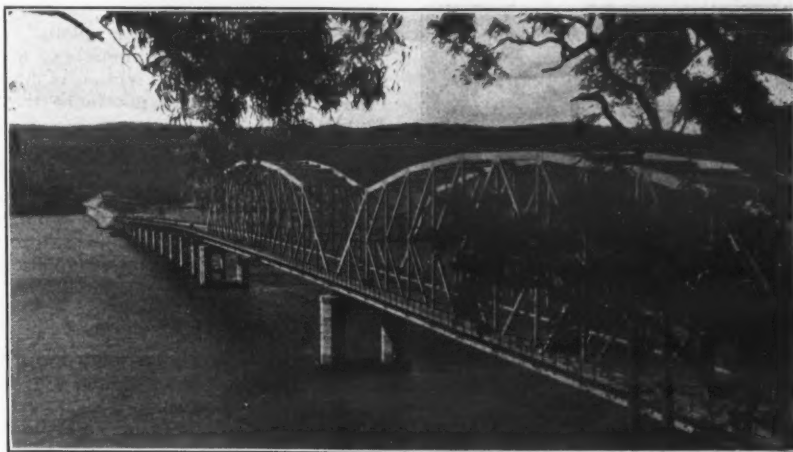
Butt welding of splices was discarded for built-up sections, on account of the large and uncertain cooling stresses that would be developed. On account of the smaller working stresses specified for butt welds, as compared with the parent metal, it was decided to use fillet welds for all connections, except in the case of the verticals where the  $1/r$  ratio governed design.

Both designs, welded and riveted, were prepared by the same engineer, as it was felt that this would give a better comparison. The bid figures obtained were these:

	Riveted Truss	Welded Truss
Steel in trusses	22.8 tons	16.8 tons
Steel in entire span	48.0 tons	38.3 tons
Unit rates for trusses, in place	\$102.00	\$122.00
Unit rates, average for span, in place	100.00	109.00

The total cost of the steel in one span was \$4,773 for the riveted construction, and \$4,164 for welded. These figures indicate that a saving was possible of 13 per cent in cost and 20 per cent in the weight of the structure.

A study of the designs, bids, and the work during actual construction revealed where these savings were obtained. One source of saving was the fact that gross sections could be used for tension members. Another was that there was a better distribution of metal in the compression members; this resulted in larger values of  $r$ —for the same area—which is of the utmost importance in the design of vertical members. A third saving was possible since deductions for rivet holes in cross-girder flanges could be eliminated. And



The Hawkesbury River Bridge in New South Wales, Australia, consists of two simple span trusses, each 438 feet long, constructed largely by the shop-welded method.

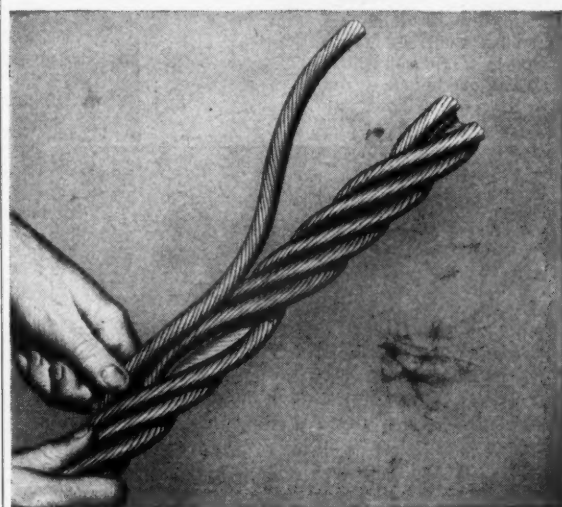
last, costly lacing for the upper chord and the end posts was eliminated.

The main disadvantages anticipated were the high cost of field welding due to the lack of skilled welders, and the

high cost of transporting the welded structural members.

Therefore the design was studied to see if field welding could be eliminated.

(Continued on next page)



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This is an I-section of the top chord of the Hawkesbury Bridge truss spans. It is rigid enough to take a maximum compression stress of 15,000 psi. The I-sections were built with four rows of welding, and did not require the use of diaphragms.

## Welded Members Used For Highway Bridges

(Continued from preceding page)

This was found to be possible by using riveted connections at all field joints. The rivet-hole deductions for tension members were balanced by additional reinforcing plates welded to the ends of tension members. This showed a saving in the total cost of steel as compared with the all-welded truss. Subsequent designs were therefore based on shop-welded and field-riveted connections.

### Hawkesbury River Bridge

In 1937 the Department issued a call for the construction of a bridge over the Hawkesbury River. Contractors were asked to submit bids on two designs—one of these had two simple span trusses, and the other was designed with cantilevered trusses. Both designs, consisting of K-system trusses, were to be shop-welded and field-riveted. Contractors were also free to bid for a bridge of their own design.

The bids showed that the most economical design submitted was the one with two simple span trusses, each 438 feet long, constructed by the welded method. The designs called for welding for the great majority of the connections, and riveting for the large connections where welding was shown to be less suitable.

### Design of I-Sections

The I-sections of the top chord of the bridge truss spans are rigid enough to take the maximum permissible compression stress of 15,000 psi, and the tension members of the truss are rigid enough to take a maximum tension stress of 18,000 psi of gross area. The I-section was deemed unsuitable for the horizontal members, as it forms a trough where water can collect. Therefore, the horizontal bottom chord was designed as an inverted U-section. This section is less economical because it requires six rows of welding and a few diaphragms, while the I-sections were built with only four rows of welding and did not require the use of diaphragms.

The specifications covering the minimum thickness of a flange plate of an I-section in compression stated that its width should not exceed 32 times its thickness. This was derived from the bridge specification for riveted members: "The outstanding leg of plate shall not project more than 16 times the thickness of the plate past the last line of rivets." For example, a flange 16 inches wide requires a minimum thickness of  $\frac{1}{2}$  inch. This specification was extended to the thickness of the web plate of the I-section in compression: the minimum thickness of the web

plate must not be less than the minimum thickness of the flange plate.

When lightly stressed members are in compression, and the section is governed by rigidity ( $l/r$  not more than 120) and not by stresses, the I-section can be uneconomical. For a large proportion of the material is in the area of the web, which is the neutral axis. In this case, it is more economical to neglect the section of web for calculation of rigidity and its area for calculation of the unit stress in the members.

### Testing the I-Sections

After the design was completed, some engineers raised the question of the safety of using this section without diaphragms for compression members, when the thickness of the flange plates

was only  $\frac{1}{32}$  the width of the plate. Models of the I-section were built and tested in the Engineering Laboratory of Sydney University. Four model columns were built having a flange plate  $7\frac{1}{2} \times \frac{1}{2}$  inch, a web plate  $3 \times \frac{1}{4}$  inch, and a length of 7 feet 9 inches. Total area was 8.25 square inches, or one-quarter the size of the actual Hawkesbury Bridge members. The rigidity of the actual truss member and of the model column was the same—each having values of 55 and 45 for the  $l/r$  ratio, about the two axes of symmetry.

Two models were built with diaphragms, and two without. The ends of the columns were rested on spherical bearings in the testing machine, so as to have a close approximation to the actual columns which were pin-connected at

the ends. The tests were carried out to destruction. The columns with diaphragms failed under loads of 275,000 pounds and 310,000 pounds. The columns without diaphragms failed at 295,000 pounds and 300,000 pounds. It can be mentioned here that the average ultimate stress of the four tested columns was 36,000 psi, and their coefficient of safety was 2.65 using the formula of allowable stresses for pin-connected columns  $[18,000-80 (l/r)]$ .

### Members Used for Trusses

The truss spans are divided into 14 panels, each 31 feet 4 inches long, with cross girders at each panel point, longitudinal stringers, and a concrete-slab deck. The stringers were made con-

(Continued on next page)



## Iowa

"Caterpillar" D7 Tractor and No. 70 Scraper leveling ground for Muscatine athletic field. Owner Lee Osborne says: "If I can have two months more of good weather, this scraper won't owe me a thing. It's a fine scraper and it has a fine dealer service behind it. I wouldn't think of buying this type of equipment from anyone but 'Caterpillar'."

## Indiana

"Caterpillar" D7 Tractor and No. 70 Scraper grading road for subdivision. Lowell Engineering Company's Lyle W. Brown says: "This scraper makes loading easier—can load in 2nd gear. Swung low to ground for balance. Can get in close quarters. Large tires give good flotation in sandy soil. Allows good visibility of road and cutting edge."



## Arizona

"Caterpillar" D7 Tractor and No. 70 Scraper leveling farmland for cotton near Buckeye. Owner J. C. Higgins says: "The No. 70 is a dandy. Ease of loading is what I like best. I can fill the scraper without the pusher. This saves me money as I can have the pusher tractor working on some other job."

# They all



## New York

"Caterpillar" D7 Tractor and No. 70 Scraper stripping overburden from gravel pit to supply sub-base for highway. Owner, Rochester Concrete Construction Co. Inc. Operator Leon Jackson says: "It's the easiest scraper to load I've ever used and I can dump in 6th gear."



tinuous over two panels. The cross girders are of welded construction with 48 x 5/16-inch web plates. The flange plates are 12 x 1 1/2 inches for cross girders at the center of the double panel stringers, and 9 x 1 1/2 inches for cross girders at the joints in the stringers.

The stringers are of two-span continuous-beam construction and are set on 4-foot centers. They are rolled joists made of 20 x 7 1/2-inch x 90-pound steel, and are braced in pairs by cross angles. Those on the top of the cross girders have expansion joints on every second cross girder. These are for the purpose of relieving the deck system of the tension stress in the bottom chord of the trusses.

All truss members are welded I-sections except for the bottom chord, which

is a welded inverted U-section. The sway bracing consists of two struts connecting the panel points of the top chords, the K points of the trusses, and two cross diagonals. All these members are of two angle-star construction. The portal bracing is of a similar design. The top and bottom chord lateral bracings are two cross diagonals—the top laterals are two angle-star sections, and the bottom laterals are welded I-sections.

#### Erection of Welded Trusses

The main disadvantage of built-up welded members for truss work is the distortion likely to be suffered by the members during the process of electrical welding.

In the earlier welded small-span

truss bridges designed by the Department, the I-section was used for vertical and inclined members, and the inverted U-section was favored for horizontal chord members. The U-section consisted generally of two channels with a cover plate on top. The small overlap of the top plate required two rows of continuous fillet welding along the members. As the contraction was on one side of the section only, it resulted in the finished member becoming bowed. To counteract this distortion, the member should be pre-bent in the opposite direction to the bending produced while welding. To avoid the necessity of pre-bending, it is advisable in the design of welded built-up members to choose sections where the welding will be placed symmetrically about both axes.



I-sections are apt to form a trough which collects water. So this inverted U-section design—though it required more welding—was used for the horizontal bottom chord of the Hawkesbury River Bridge.



**California** "Caterpillar" D8 Tractor and No. 80 Scraper loading and dumping shale rock on county road widening job. For Monterey County Highway Department, Mr. H. Cozzens says: "We do a lot of changing from 'dozer to scraper work and appreciate the ease of quick mounting. The No. 80 Scraper is the easiest and fastest loading, and operator says cable control is the smoothest he has ever used."

**Colorado** "Caterpillar" D8 Tractor and No. 80 Scraper building 25-foot fire-wall for refinery tank yard in soft, sandy soil. Owner Fred DeBetz says: "I have used most makes of scrapers and this No. 80 'Caterpillar' is by far the best I have ever used."

## Cheer for "CATERPILLAR" SCRAPERS

The success of "Caterpillar" products has always been based on outstanding performance in the field. As with Tractors and Engines, it is the fine performance of "Caterpillar" Scrapers that brings from owners and operators in all parts of the country such statements as are quoted here.

(The standard model No. 70 Scraper is priced at \$6050; the No. 80, \$8565—both F.O.B. Peoria, subject to change without notice.)

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**Washington** "Caterpillar" D7 Tractor, No. 7S Bulldozer and No. 70 Scraper building new road to open up new farmland. Messrs. A. N. Stanley, James Reilly and Charles L. Hall, Commissioners of Clark County, owner, write: "The county's past success with 'Caterpillar' Motor Graders prompted us to buy this new 'Caterpillar' Diesel Tractor and Scraper. We like them so well that we are now considering the purchase of another D7 Tractor and No. 70 Scraper."

The built-up I-section now used by the Department satisfies these requirements and remains straight after welding.

Considering the member as a whole, the welding in the I-section is symmetrical. But it is not symmetrical about the axes of the flange plate, and the result is that both flange plates tend to "dish in", or act as troughs with concave surfaces towards the web plate. To correct this, each flange plate should be clamped down on the welding table with the packing opposite the web plate. This will produce a dishing-in in the opposite direction. In the Hawkesbury River Bridge, the flange plates were 16 x 3/8 inch, so a packing strip of 3/16-inch thickness was used. This will vary for different flange plates and different sizes of welding fillets.

In this bridge, precaution was taken against dishing-in for all I-sections except the top chord members, as it was considered that these were too thick to be affected by fillet welding, or to be pre-bent in a jig. The result is that all these flange plates are dished-in to varying degrees. The maximum depth is 3/16 inch in the thinnest flange plate of 30 x 1 1/4 inches; and the minimum is 1/8 inch for the thickest flange plate of 30 x 2 inches. Although this distortion was well within the 2 per cent allowed, it did give trouble in the erection of the truss. However, this could have been avoided by pre-bending the largest plates, using 1 1/2-inch bolts on 12-inch centers for clamping them to the welding table.

In bolting up the connection of the truss members by 1 1/4-inch-thick gusset plates prior to riveting, it was found that the gussets followed the dished curvature of the 2-inch-thick flanges of the top chord, making a difficult entry for the web members of the truss. To make the erection more difficult, the depth of some truss web members was not as exact as would be desired, owing to the contraction after welding which makes the finished depth less than the depth set up for welding. Care must be taken in setting up to make proper allowances for this contraction which varies with plate thickness.

#### Welding Specifications

The Department has set up certain specifications for the welding procedure to be used in the construction of road bridges.

1. Welding must be carried out by welders who, in the opinion of the Department of Main Road's Engineer, have had suitable training and practical experience in this form of construction. Before commencing work, and afterwards at intervals not exceeding two weeks, each welder shall make a test piece of the standard form and dimensions. The welding of this test piece must conform with the specification to the satisfaction of the engineer. No welder may begin work until his first

(Concluded on next page)



## Welded Members Used For Highway Bridges

(Continued from preceding page)

test has been accepted as satisfactory. He may continue only as long as his periodical tests are deemed to be satisfactory. All test specimens are made and tested at the contractor's expense, under the supervision of the engineer.

2. Plates and sections must be reasonably free from all paint, heavy scale, or any substance which might affect the quality of the weld. Where a weld is to be deposited on a flame-cut surface, the surface must be rendered reasonably free of scale before welding.

3. The landing edges of plate sections to be welded must be closed by service bolting, cramping, jigs, or tack welds. When the work is liable to distortion during welding, it is held in approved frames or jigs.

4. Wherever possible, the welding must be carried out in such a manner as to minimize distortion and contraction stresses by applying the welding in intermittent stretches and by back-step welding—welding from the outside edge or end towards the center, or vice versa. No member at any time during fabrication may depart from its correct alignment more than  $\frac{1}{4}$  inch in any 10-foot length.

5. All slag must be removed and the weld thoroughly cleaned before a run of welding may be superimposed on a previous run.

6. The welding must be deposited in runs of clean metal, free from slag inclusions, and without any porosity. Tamping and hammering of the metal is prohibited, but the slag may be chipped from the metal with a light hammer.

7. The weld must be free from undercutting. All undercut portions of butt welds must be re-welded and, if required by the engineer, any undercut portions of fillet welds are re-welded. If the weld metal tends to fold over on the parent metal without proper fusion, it must be cut out and re-welded.

8. The current used must be that required to carry out the welding as specified. It is varied to meet conditions, but generally falls between the limits set up by the Department. The Department has also set up a standard for the amount of metal deposited in one run of a net length of 16 $\frac{3}{4}$  inches of electrode.

9. In butt welds, the plates must be prepared by cutting the edges to produce the shape shown for the ends to be welded. Edges are to be finished square, true, and smooth—either by machining, sawing, shearing and grinding, or flame cutting and grinding. The butting ends of compression members are faced in a milling or an approved end-planing machine. All butt welding of flange and web plates must be carried out with the plates flat before the flange and web are assembled. Where reinforcing plates are welded to one or both plates to be butt-welded, the reinforcing plates must be welded on before the ends or edges are shaped for welding. The resulting section is then butt-welded in one operation. For the first run, electrodes larger than a No. 8 gage must not be used.

10. When the V of a single-V, or the first V of a double-V butt weld is filled with weld metal, the plate must be turned over, and any slag remaining on the back of the first run removed before welding is begun on the other side.

### Comparison of Costs

For those who doubt that costs for welded bridge work for the Hawkesbury River Bridge were lower than the rates for riveted work, here is some information on prices obtained from the superintendent of a large N. S. W. engineering firm which manufactures steel work for bridges.

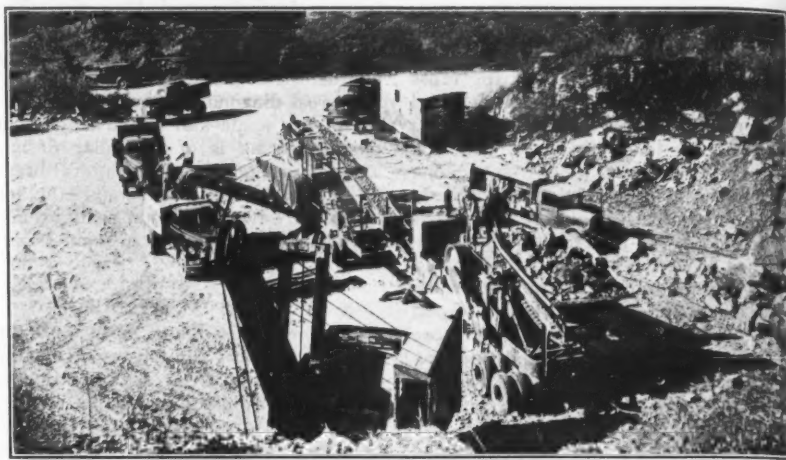
He advised that if bids were being

prepared, he would submit these prices to his head office for supply and shop fabrication of 30-foot-long members. The figures do not include end connections, painting, or shop erection. (1) Welded 3-plate I-sections as used on the Hawkesbury truss, \$56 per ton. (2) Riveted 4-angle and 3-plate I-sections of the same cross-sectional area and overall dimension, but smaller radii of gyration, \$85 per ton. And (3) riveted 8-angle and 3-plate I-section (stiffened flanges) of the same cross-sectional area, overall dimensions, and radii of gyration as in No. 1, \$91 per ton.

From a paper receiving one of the awards in the 1947 James F. Lincoln Arc Welding Foundation "Design for Progress" Program.)

### Plant for Road Aggregate

A 2-unit portable crushing and screening plant is shown in the accompanying photo, producing road aggregate from quarry rock. The plant is typical of a new line built by the Pioneer Engineering Works, Inc., of Minneapolis,



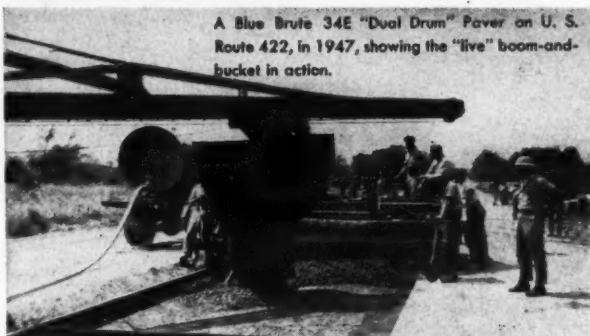
This 2-unit portable crushing and screening plant built by the Pioneer Engineering Works, Inc., is producing road aggregate near Lancaster, Wis.

apolis, and is operated by Becker & Tuckwood, near Lancaster, Wis.

The primary unit is a No. 24 x 36 jaw crusher equipped with a 36-inch x 12-foot apron feeder. The secondary unit

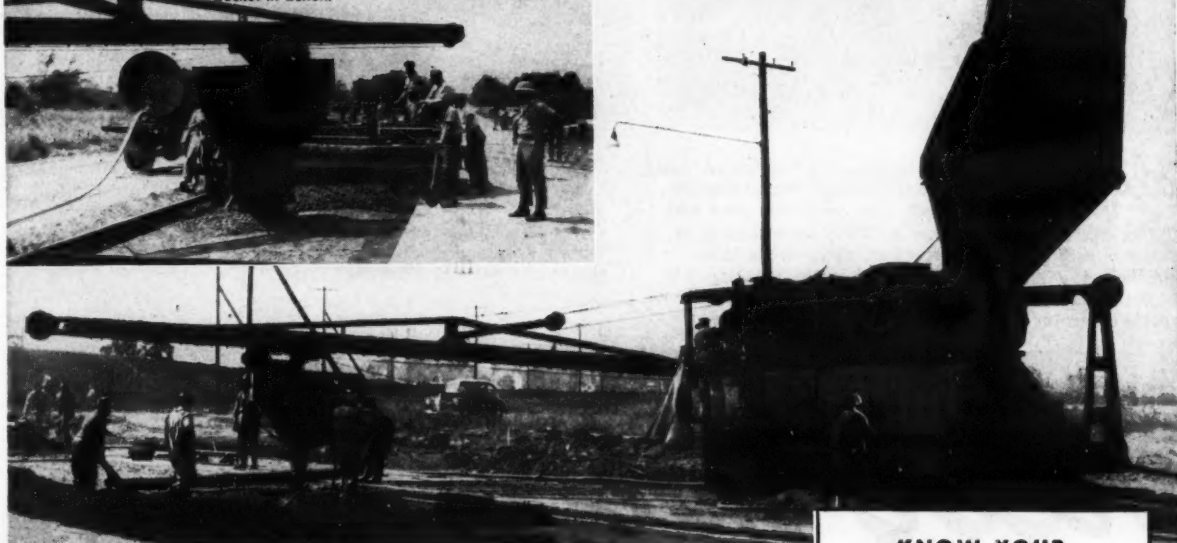
consists of a 40 x 22 roll crusher and a 4 x 10-foot 3 $\frac{1}{2}$ -deck vibrating screen. A split-feed arrangement is designed to provide an effective screening area of 80 square feet.

## WHEN A BLUE BRUTE PAVER SET THE PACE...



A Blue Brute 34E "Dual Drum" Paver on U. S. Route 422, in 1947, showing the "live" boom-and-bucket in action.

The same Paver in October, 1946, pouring concrete on Route 1, near Newark, N. J.



No paving job moves faster than the pace set by its paver. That's why S. J. Groves & Sons Co. selected Ransome Blue Brute 34E Dual Drum Pavers for jobs where fast performance was a "must".

Speed counted on the new 3-lane U. S. 422 between New Castle, Pa., and Youngstown, Ohio, delayed by abnormally heavy rains and lack of skilled manpower. Here a Ransome Blue Brute 34E Dual Drum Paver set the remarkable pace of  $\frac{1}{2}$  mile per day. This was the very same Blue Brute, incidentally, that performed a rush job the year before on U. S. 1 near the Newark, N. J. Airport. Here, fast-growing traffic demanded a tremendous widening project in a hurry.

That's where the 34E's many advanced features proved themselves.

For example: the fool-proof, self-cleaning, fast-charging skip... mechanically operated batchmeter for all-weather accuracy... precision water-measuring... and the exclusive, hydraulically operated "live" boom-and-bucket combination that spreads as it swings, cutting down costly hand shoveling.

Geared to the output of the Blue Brute Paver, these large-scale paving operations were carried out smoothly... economically... on time! And that's why a Ransome 34E, Single or Dual Drum, on your own construction jobs will lay more yardage... more accurately and with less manpower... than any other paver. For full details, see your nearby Worthington-Ransome Distributor, or write for Bulletin 208.

### KNOW YOUR

## BLUE BRUTES

Your Blue Brute Distributor will be glad to show you how Worthington-Ransome construction equipment will put your jobs on a profitable basis.

### RANSOME EQUIPMENT

Pavers, Portable and Stationary Mixers, Truck Mixers, and Accessories.

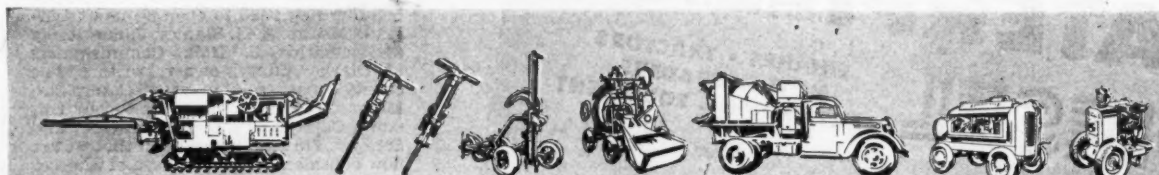
### WORTHINGTON EQUIPMENT

Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Self-Priming Centrifugal Pumps and Accessories.

### WORTHINGTON

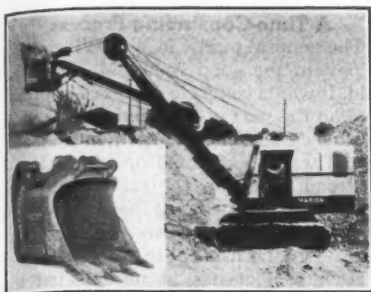
Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.  
Distributors in all principal cities

## BUY BLUE BRUTES



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB





Standard equipment on the new Marion 33-M shovel will be this ¾-yard dipper made by Pettibone Mulliken Corp.

### Hydraulic Tail-Gate Acts as Truck Loader

A hydraulic tail-gate which can be used for raising loads from the ground to the truck-deck level is made by The Day Co., 306 W. 69th St., Chicago 21, Ill. The lift platform is designed to lift or lower loads of up to 1,200 pounds, and to remain level throughout its travel. When not loading or unloading, it is used as a regular tail-gate.

It is made in two models and will fit most standard makes of 1½-ton trucks. One model is equipped with an attachment for driving the hydraulic pump from a power take-off; the other model is equipped with a hand-operated hydraulic pump.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 29.

### New Detergent Oil

A heavy-duty oil said to be fully detergent and fully dispersive is produced by the Pennsylvania Refining Co., 2686 Lisbon Road, Cleveland 4, Ohio. Refined from 100 per cent pure Pennsylvania crude oil, it will be marketed under the trade name of Colonel Drake heavy-duty oil. It is specially compounded for diesel and gasoline engines in heavy-duty service.

Foaming is prevented by chemical additives, the company explains; and sludge and soot particles, kept in constant suspension, drain off during oil changes. According to the refiner, ring sticking and bearing troubles are eliminated; and the oil's low pour point and high viscosity index give efficient service over a wide range of temperatures. Colonel Drake is also reported to be non-corrosive and to safeguard copper-lead and other alloy bearings.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 20.

### Emergency Light Unit

An emergency lighting unit designed to supply light when regular line currents fail is made by the Electric Cord Co., 30 Church St., New York 7, N. Y. When plugged into any socket in the lighting circuit, this unit automatically cuts in as soon as the current fails, the company explains, and goes out when normal current is resumed.

The Minuteman is equipped with two lamp heads, each of which is said to deliver 100 watts for about 5 hours. These lamp heads are adjustable to any position and may be removed from the unit for installation on walls, stairways, etc.

The unit is portable and requires no special wiring. It has a built-in charger which restores the battery to full power when the unit is not in use.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 28.

### Kit With Impact Tool

A tool kit which contains equipment for drilling in steel, masonry, or wood, for nut and bolt running and removal, and for screw driving and removal, is put up by the Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. The kit is built around the Ingersoll-Rand elec-

trical impact tool, designed for use on jobs such as wire brushing, applying and removing studs, tapping, reaming, extracting broken cap screws and studs, and doing hole-saw work.

The kit is assembled complete or with accessories as desired. With standard equipment, the kit contains the impact tool with a Jacobs collet-type chuck, six hex sockets of varying sizes, a Morse taper socket, and an adapter sleeve. Other equipment includes twist drills, reamers, taps, carbide-tipped masonry drills, hole saws, screw and stud extractors, wood bits, wire brushes, various kinds of screw drivers and adapters, and a universal joint and anvil extension.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 11.

### Road-Planer Attachment

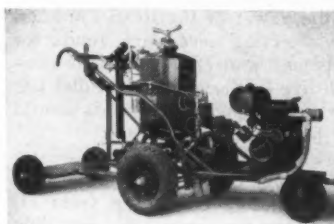
Literature describing its road-planer attachment can be secured from the Pneu-Hydro Road Machinery Co., Cadillac, Mich. Designed to fit all trucks, it is made in two types and three sizes—

for hydraulic or pneumatic operation, and in 9, 10, and 12-foot blade widths.

The catalog shows the unit attached to a truck, and illustrates the location of the necessary pumps and controls. It pictures the unit in use on several types of grading jobs, and shows how it adapts

to each of these. Also contained is a list of specifications for each of the sizes, and letters of recommendation from various users of the Pneu-Hydro planer.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 96.



### All-Purpose Striper Solves Zone-Marking Problem

Self-propelled and completely self-contained, designed to meet the needs of state and county highway departments, municipalities and airports for accurate high speed striping.

Clean-cut, attractive lines are assured with K-C Air Curtains. Air actuated traction up to 5 MPH with a trailer for the operator. Truck mounted and other models available for all requirements. Write for folder.

**KELLY-CRESWELL CO., Xenia, Ohio**

there's no *dozing* here

There's no "dozing" on the job with an Oliver "Cletrac" tractor. This hard-working, hard-hitting tractor with its Heil Trail-builder keeps any dirt-moving job going at top speed.

An Oliver "Cletrac" crawler tractor is a natural for dirt-moving. The famous "push that doesn't pause" puts more power behind the blade...lets you move more dirt in less time. There's always power on both tracks, even on the turns, permitting the tractor to handle

off-center loads with ease. The pull of one track can be balanced against that of the other, eliminating the time-wasting, load-losing "jackknifing" required with ordinary tractors. With an Oliver "Cletrac," you can keep moving straight ahead with no wasted motion. And, since there is power on both tracks on the turns, it's a safer handling tractor on hills and rough ground.

For all the facts, see your Oliver "Cletrac" Dealer.

**Cletrac**

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INDUSTRIAL DIVISION: 19300 EUCLID AVENUE, CLEVELAND 17, OHIO





## State Gets After Her Rural Roads

### Sets Up Road-Selection Plan Which Gives Rural Counties a Voice; Allocates Funds More Equitably

+ ALL of West Virginia's primary roads are either paved or stabilized to provide year-round travel. But the State has 17,000 miles of secondary roads that have not been paved or stabilized in any way. Like many another state in the Union, especially those in agricultural areas, she faces a pressing problem: how to implement the demand for good secondary roads with the money to build them.

Her problem and her plan to meet it were discussed by L. C. Madden, Engineer of Plans and Surveys for the West Virginia State Road Commission, at the annual meeting of the Southeastern Association of State Highway Officials last December.

#### Secondary Roads Are Urgent

West Virginia ranks high among the coal, oil, gas, and timber-producing states, said Mr. Madden. And much of its population depends on farming for a livelihood. Main highways are of vast importance to the state, but what good are they without secondary roads to bring out the farmers' milk and produce, fruits from the orchards, lumber from the mills?

For the most part, the unimproved secondary roads do not carry much traffic. But almost all of them are farm-to-market roads which connect with primary and secondary roads to provide the sole outlet for the innumerable small farms of the state. If the farmer is not given adequate means of getting his produce to market, he is going to stop growing food except for his own needs—to the danger of the state's economic security, Mr. Madden said.

This is not all. Many of the unimproved secondary roads are rural mail routes, milk routes, and school-bus routes. Still others would be milk and school-bus routes if they were put in condition for uninterrupted travel. But as it is, milk trucks and buses have to do a lot of backtracking at considerable waste of time and added expense. Moreover, ultimate success of the state's consolidated-school system—which calls for daily transportation of many school children by bus—depends on a large connected system of all-year primary and secondary roads.

The state's very balance of population depends on the same connected system of all-year roads. War has upset that balance, and caused the migration of agricultural workers to industrial areas. To effect a decentralization of the population again, more and more secondary roads will have to be improved to provide uninterrupted travel, said Mr. Madden. Industrial workers cannot risk being kept from their jobs by bad roads.

#### Problems in the Way

These are the urgencies of West Virginia's secondary-road problem. Her hurdles in meeting it have been much like those confronting her sister states. During the war, her secondary-road building was confined largely to access roads to sources of raw material such as coal and lumber. Since the war, shortages of materials, equipment, and engineers have slowed up her program. And in addition to her secondary-road needs, she faces a big post-war rehabilitation program as well as a backlog of primary-road projects. One of her largest construction programs got under way in 1947 and will continue in 1948.

#### Selection and Fund Distribution

A little more than a year ago, Mr. Madden explained, the State set up a special plan for selecting secondary roads to be improved—roads that would be of the most benefit to the greatest number of people. It was called the Magisterial Good Roads Committee plan. Its purposes were (1) to decentralize the power of the Road Commission in selecting secondary roads for improvement, and (2) to give the people who live in the magisterial districts a voice in deciding which roads should receive priority consideration.

Although the Commission made no effort to select committee members, it advised that they be chosen from all sections of the magisterial district. This advice was carried out almost without

exception.

The formula for distributing secondary-road funds was also changed recently, Mr. Madden explained, by the State Legislature. Formerly distribution had been based on population. But after July 1, 1947, funds were allocated more equitably on the ratio of unimproved roads in the county to the total mileage of unimproved roads now existing in the state.

Under this new arrangement, rural counties will be given some real and worthwhile help, he said. And centers of larger population, which already have a high percentage of improved roads, will receive an increased appropriation for maintenance. Thus the overall allocation of funds will not be changed to any damaging extent.

#### A Time-Consuming Process

The general public in West Virginia is impatient for good roads, Mr. Madden said. It wants concrete evidence of progress on the part of the Commission. But to each citizen, concrete evidence means actual work performed on his particular road, since he is usually not in a position to see what is being done on someone else's road. And he has little idea how long it takes to get started.

Each project has to be selected by the Magisterial Good Roads Committees in each of the state's 352 magisterial districts. (This selection alone eats up quite a little time, Mr. Madden added, as it isn't always easy to get committee members to agree.)

After the projects are chosen, they (Concluded on next page)

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## For hundreds of Heavy

53 H.P. at 1500 R.P.M.

## THE INTERNATIONAL UD-9 DIESEL POWER UNIT

There is no better heavy-duty engine of half a hundred horsepower than this 4-cylinder, valve-in-head International Diesel. It provides dependable, low-cost power for operating rock crushers, conveyors, fans, pumps, hoists, pavers, compressors and many other units of equipment for construction and road building.

The UD-9 develops 53 horsepower at 1500 r.p.m. This is working horsepower, for industrial intermittent load applications. And it is economical power because of the operating efficiency and ruggedness of the International design.

Yes, for low-cost, dependable power there is no question about the superiority of the engine or power unit that bears the International name. Your International Industrial Power Distributor is prepared to prove this to your complete satisfaction.

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CRAWLER TRACTORS  
POWER UNITS  
DIESEL ENGINES  
WHEEL TRACTORS

# INTERNATIONAL

have to be listed and submitted to the West Virginia District Office of the Public Roads Administration for programming approval. Then PRA engineers have to inspect each project in the field and prepare a report on it, indicating whether or not it is eligible for inclusion in a Federal-Aid program. The Washington office of the PRA must check the program for final approval.

The average citizen has little concept of all this. He is also unaware of the surveys and plans which have to be prepared and which have to be both field and office-checked by PRA engineers, or of the cost estimates which have to be prepared and approved. Early in 1947 there were about 3,000 miles of roads on the state's Federal-Aid secondary system. Now there are

about 11,000 miles, or about 8,000 miles to be added—no small amount of work, Mr. Madden remarked.

#### Progress Made

Nevertheless progress has been made, he reported. The 1946 allocation for the Federal-Aid secondary-road construction program amounted to \$4,250,000 and involved 19 projects about 60 miles in length (some of it on the state primary system). All of these projects have been completed or are under contract, except for two recently added to take up funds, which were made available by underruns on projects in the original program.

The 1947 Federal-Aid secondary-road program consisted of 57 projects about 215 miles in length (all of it on

the state secondary system). The program has been approved by the PRA, and is estimated to cost \$4,229,292.

Of the 57 projects, Mr. Madden reported in his December speech that 10 were under contract, 5 were advertised for letting but rejected on account of excessive bids, 10 had not been approved for letting though surveys and plans had been completed, 28 are now being surveyed and planned, and the remaining 4 have not yet been surveyed. In addition, he said, several secondary projects are under construction by state maintenance forces and by prison labor.

#### Type of Improvement

Design standards as approved by the AASHO for secondary roads, dated August 1, 1945, are being conformed to on

all this new work. Right-of-ways are being obtained for a 40-foot uniform width, plus easements for slopes; a minimum of funds will be expended for this purpose.

One-lane roads are graded to a 20-foot width, including ditches, and are given a 10-foot-wide surfacing. Two-lane roads are graded to a 26-foot width, including ditches, with a 16-foot-wide surfacing. The Commission proposes to do very little grading—most of it with bulldozers, truck shovels, and power scrapers—and to modify horizontal and vertical alignment only to conform to the minimum design standards adopted by the AASHO August 1, 1945.

The types of drainage being used, unless pipe culverts only are required, are sectional plate arches—single and twin-span.

Local materials such as creek gravel, red dog, chert, and hard shale are used wherever they are available, or crusher-run sandstone and limestone from local quarries. Where local materials are not available, the State uses crusher limestone, slag, and gravel from commercial sources.

All surfaces are being traffic-bound. This requires only the use of trucks for hauling and of power graders for blading. Depth of surfacing varies with the type of soil encountered, and runs from 6 to 8 inches.

Surfaces that will carry considerable traffic are treated with chloride or road oil, to eliminate the dust nuisance and to reduce blading costs and loss of material. As traffic demands it, many of the roads will later be given bituminous surface treatments.

Two more construction details were supplied by Mr. Madden: the State is using concrete or metal crib abutments with reinforced-concrete slabs; and low-water crossings are being built with a battery of pipes, and either stone or concrete riprap bank protection.

#### Costs

Grading, drainage, and traffic-bound surfacing for projects on the 1947 Federal-Aid secondary-road program is costing West Virginia from \$15,000 to \$30,000 a mile, Mr. Madden reported. For one-lane roads, the average cost per mile for grading, drainage, and native shale or native gravel traffic-bound base is \$19,000. For two-lane roads it is \$25,000 a mile.

The average drainage cost is \$5,000 to \$7,000 a mile. A low-water crossing, installed in place of a 40-foot-span bridge which would have cost about \$14,000, cost about \$3,300. Estimated cost with concrete bank protection is \$6,800.

Mr. Madden broke down these costs for his audience into the following average unit prices (no bids had yet been received on crushed stone or slag):

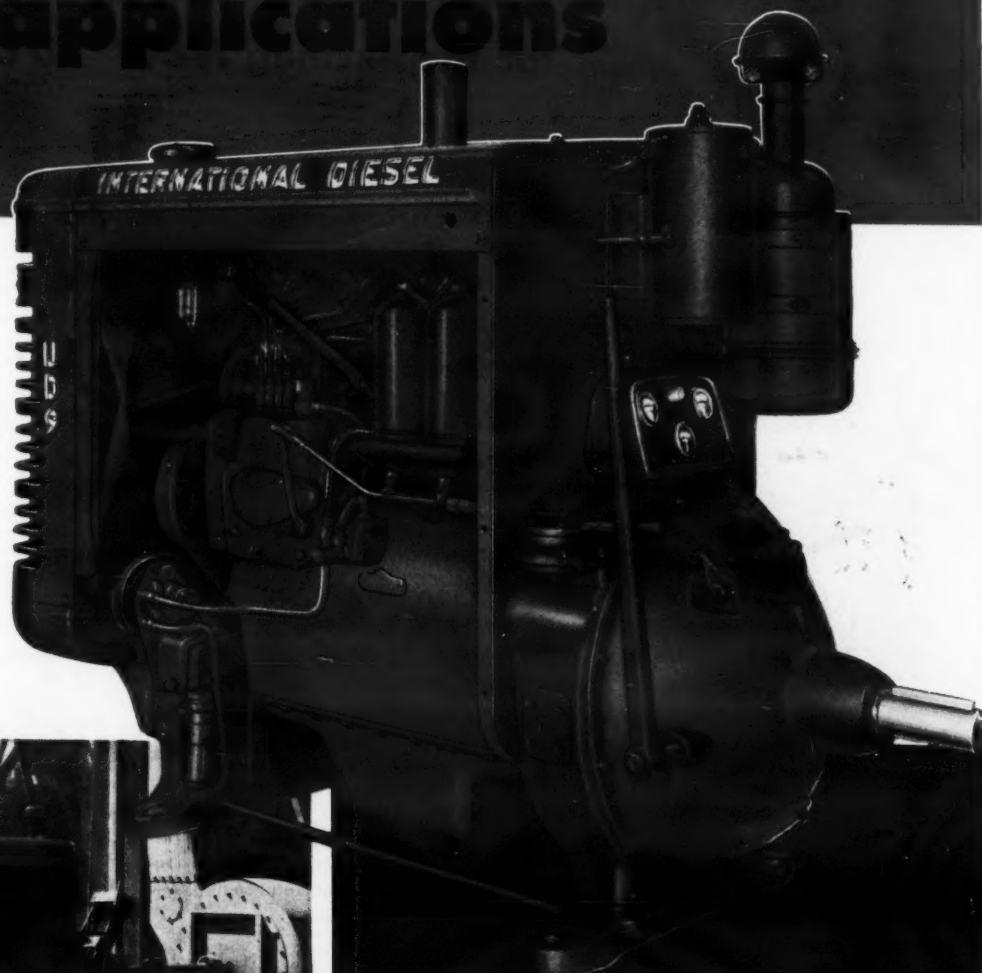
Item	Unit Bid Price
Clearing and grubbing	\$0.15 per lin. ft.
Unclassified excavation	.75 per cu. yd.
Structure excavation	3.00 per cu. yd.
Riprap	5.00 per cu. yd.
Special rock fill	1.50 per cu. yd.
Sectional plate arch (one-gage)	48.00 per lin. ft.
Traffic-bound base stone	5.00 per cu. yd.
Traffic-bound base of native shale or native gravel	1.40 per cu. yd.
Pipe culvert, 60-inch	17.75 per lin. ft.
Pipe culvert, 72-inch	24.00 per lin. ft.
Pipe culvert, 84-inch	30.00 per lin. ft.
Scarifying and manipulation	.05 per sq. yd.
Class B concrete	39.00 per cu. yd.
Stone masonry	16.00 per cu. yd.

He added that the type of improvement set forth represents no reduction in the state's past standards for secondary roads which are lightly traveled and therefore do not deserve a higher standard of improvement.

In conclusion, he said that the State's district engineers had been instructed to select one project in each county to be built with state funds alone. Though only one such project to a county can be undertaken, because the bulk of state funds will be needed to match Federal funds, each will push the state that much nearer to her goal—a large connected system of all-year primary and secondary roads to provide uninterrupted travel for her citizens.

# LOW-COST POWER

## Duty applications



Dependability is built into International Diesel Power Units. Construction features that make them superior for all heavy-duty powering jobs include: self-contained, all-weather starting system; advanced design combustion for maximum utilization of fuel; single-plunger International fuel injection pump that meters fuel accurately to meet all load conditions as interpreted by a sensitive, variable-speed governor and torque control; induction-hardened crankshaft; precision-type bearings; full-pressure lubrication; by-pass type thermodynamic cooling, and adequate, efficient filtering of fuel, lube and air.

Applications of the UD-9 Diesel Power Unit as shown in the pictures to the left are representative of the many and diverse uses to which this dependable power may be put. International Diesels have the lugging ability—the hang on under load—to pull through and deliver the power you require at all times . . . at lowest cost for fuel, lubrication and maintenance.



# Industrial Power





A special dispenser for Darex AEA air-entraining agent and a 30-gallon reservoir drum are shown here mounted on a 14-S concrete mixer.

### Air-Entraining Agent Dispensed by New Unit

A special dispenser has been developed by Dewey & Almy Chemical Co., Cambridge 40, Mass., for its Darex AEA air-entraining agent. In the set-up illustrated, the dispenser and a 30-gallon reservoir drum are mounted on a 14-S concrete mixer. Thirty gallons of Darex AEA will treat approximately 750 cubic yards of concrete.

In one position, a 3-way valve permits the Darex AEA meter box to fill; in second position it discharges the air-entraining agent from the box into the water line leading to the mixer drum. The valve is connected with a chain-and-sprocket drive to the shaft of the water valve, on which the operator has his hand in the photo.

Further information on Darex AEA and this special device for dispensing it may be secured direct from the company. Or use the request card enclosed. Just circle No. 56.

### Hooks, Tongs, and Slings Described in New Bulletin

A line of slings, grips, hooks, and tongs for handling heavy loads is made by the Downs Crane & Hoist Co., 540 W. Vernon Ave., Los Angeles 37, Calif. It is described in Bulletin No. 200 recently made available by the company. This 16-page catalog covers construction features, capacity ratings, safety factors, and other specifications.

The Downs line includes safety plate grips in both rigid and loose guide-loop types, screw plate clamps, plate and beam hooks, horizontal plate grips, open plate hooks, rail tongs, beam-flange grips, beam tongs, and belt slings. Downs also makes pipe tongs, pipe end hooks and hook clusters, drum chime tongs, barrel slings, dog hooks, utility hooks and slings, spur-pad box hooks, box tongs, carton tongs, timber end hooks, timber tongs, and special hooks, tongs, and grapples designed and built for handling material of any size, weight, or shape. The line includes rings and links in many sizes and shapes, also a complete line of wire-rope slings and chain slings.

The catalog lists all the various sizes and shapes in which these items can be supplied—giving dimensions, capacities, and other pertinent data. The final page of the bulletin features data for estimating sling capacities and dimensions at various angles by the use of simple multipliers; and a table of comparative weights and average breaking strengths of materials which are commonly used for slings.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 93.

### Midwest Manager for PCA

Appointment of A. M. Davis of Lansing, Mich., as Manager of Midwestern Offices has been announced by the Portland Cement Association. He succeeds to the position made vacant by

the election of Carl D. Franks as Vice President. Mr. Davis will handle the ten midwestern states comprising the territory from his offices in Chicago. He is succeeded as District Engineer in charge of the PCA Lansing office by J. Gardner Martin of Detroit.

### Nylon-Rubber Belt

A nylon-reinforced V-belt for power-transmission use is announced by the United States Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y. It contains a series of nylon cords covered with a special synthetic rubber compound designed to withstand the deteriorating effects of heat and oil.

The new belt is said to have great flexibility, high tensile strength, and sufficient elasticity to absorb shock. It will be marketed as U. S. Royal Super Service V-belt. Fractional and multiple sizes will be available.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 13.

## Check these advantages!

Compare the Features of the High Discharge Transport Truck Mixer:



Write for full details on this durable, efficient mixer.

- ✓ VISIBLE MIXING
- ✓ FAST OPEN TOP CHARGING
- ✓ FULL VIEW INSPECTION
- ✓ ALL STEEL CONSTRUCTION
- ✓ SUPERIOR MIXING ASSURES QUALITY CONCRETE
- ✓ ALL BEARINGS FULLY PROTECTED FOR LOW MAINTENANCE
- ✓ GOOD DELIVERY

## CONCRETE TRANSPORT MIXER CO., INC.

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**TEMPOTOOL PAVES THE WAY...**  
for the exciting New TUCKER

**THE TEMPO PRODUCTS COMPANY**  
Dept. 314 • 1900 Euclid Avenue • Cleveland 15, Ohio  
Manufactured by  
**STEMCO CORPORATION** • Rocky River, Ohio

**FASTENS STEEL TO STEEL**  
**FASTENS STEEL TO CONCRETE** *like that!*

**TEMPOTOOL**  
THE NEW Powder-Actuated HAND TOOL

**TEMPOTOOL Model "22" with Safety Shield**

**TEMPOTOOL Model "38" with Safety Shield**

**INVESTIGATE! SEND FOR THE NEW TEMPOTOOL BROCHURE NOW!**

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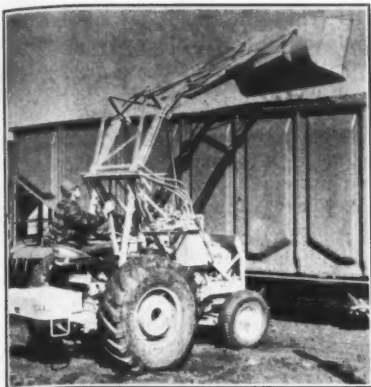
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A dumping clearance of 12½ feet and an 8-foot forward reach mark the new Model 4-BHL Shovel loader. Its lifting capacity is 4,000 pounds.

### High-Lift Loader

A new Shovel loader is announced by Lull Mfg. Co., 3612 E. 44th St., Minneapolis 6, Minn. The Model 4-BHL high-lift unit features a dumping clearance of 12 feet 6 inches, and an 8-foot maximum reach forward of the radiator shield.

The loader has a maximum lifting capacity of 4,000 pounds, and can be equipped with a ¾, 1½ or 2-cubic-yard bucket. According to the manufacturer, it requires 11 seconds to lift a load and 6 seconds to lower the bucket. At present the Model 4-BHL is available for mounting on Case Model DI or Oliver Model 88 tractors.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 54.

### Light-Duty Hand Lute

A light-duty lute for use in paving operations is made by Hy-Way Machinery, Inc., 3697 Oakwood Ave., Youngstown 9, Ohio. It is recommended by the company for spreading, leveling, and contour-shaping of asphaltic concrete, road aggregate, concrete, or topsoil. With the blade reversed, it is an efficient scraper for light duties, it is said.

The blade of the Hy-Way lute is 30 inches long and 3 inches wide. It is made of aluminum, and the 66-inch-long handle is made of wood. Total weight of the lute is 4 pounds, or 4½ pounds when equipped with a stainless-steel blade.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 48.



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### Specially Equipped Jeeps Speed Pipe Installation

Jeeps are being used to speed up the installation of steam and water mains during the construction of a \$3,500,000 Union Station in Toledo, Ohio. The Robert Carter Co., Toledo contractor, faced the problem of maneuvering heavy-duty vehicles into place without interfering with hourly train schedules. And it hit upon the idea of using special equipment mounted on Jeeps and trucks made by Willys-Overland Motors, Inc., Toledo, Ohio.

A power-operated boom and cable line was placed in a Jeep truck and is used to pick up, carry, and lower large sections of steam and water main. Power for the boom and cable line is taken from the power take-off of the truck which operates a winch located on the pick-up body. A 200-amp Hobart welder was placed in another Jeep and is operated by the center power take-off of the Jeep. A special rack was built on the back of the Jeep for carrying oxygen and acetylene tanks.

In operation, the truck picks up one of the 21-foot steam main sections and places it in the trench. The other Jeep is then driven up, the welder is regulated, a bead is run around the pipe to join the two sections, and the Jeep then drives to the next joint or welding job.

### Fuller Acquires New Plant

The Fuller Mfg. Co., Kalamazoo, Mich., has announced its purchase of the Reed Foundry & Machine Co., also of that city. Fuller manufactures a line of heavy-duty unit-mounted and auxiliary transmissions.



A Jeep and a Jeep truck owned by The Robert Carter Co. do their part on the Toledo Union Station construction job. The boom installed in the truck lowers a 21-foot section of steam main into position, while a Hobart welder installed in the Jeep is used to weld the sections together.

### Bulletins on Curved Beams

Two new bulletins of interest to structural engineers and architects working with curved beams have been published by the University of Missouri. One bulletin is by Dr. Robert B. B. Moorman, Professor of Civil Engineering; the other is co-authored by Dr. Moorman and Manford B. Tate, Assistant Professor of Civil Engineering.

The bulletins have been written to serve as an aid in the analysis and design of the horizontally curved balcony girder, canopy, and similar types of structural members. The information they contain is also designed for use in analyzing curved beams at corners of buildings where the column is omitted for architectural purposes.

Bulletin No. 35 is entitled "Influence Lines for Horizontally Curved Fixed-

End Beams of Circular-Arc Plan". Bulletin No. 36 is entitled "Stresses in a Uniformly Loaded Circular-Arc I-Beam". Also available is an earlier study by Dr. Moorman, "A Semi-Graphical Method of Analysis for Horizontally Curved Beams". This bulletin is listed as No. 29.

Copies of all three bulletins may be obtained upon request from the Engineering Experimental Station, University of Missouri, Columbia, Mo.

### Pacific Wire-Rope Sales

R. G. Huntress has been appointed Manager of Wire Rope Sales for The California Wire Cloth Corp., a subsidiary of The Colorado Fuel & Iron Corp., New York City. He will serve the Pacific coast area from his offices in Oakland, Calif.



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# Erosion Control Is Aim Of Iowa Roadside Work

## Cover and Nurse Crops Help Maintenance Men to Halt High Repair Costs; Roadside Parks Planned

† HIGHWAY engineers some time ago realized that roadside development is a practical and essential part of the highway program. And the Iowa State Highway Commission, under Fred R. White, Chief Engineer, has come a long way towards proving it.

Iowa's roadside-development work is being aimed primarily at the prevention of erosion. Seeding, mulching of slopes, and sod-lined ditches just about sum up the activities for the present. But in the planting of grasses have come a host of benefits in the form of lowered maintenance costs: less erosion, less ditch filling, and better mower performance.

When a highway is treated as a structure from one right-of-way limit to the other—and beyond, sometimes—maintenance costs go down.

### The Problem

At the present time about 2 per cent of the entire area of the state of Iowa is right-of-way owned by the State Highway Commission and the counties. In years past, highways were built with the riding surface in mind, primarily; they had to be because Iowans considered other work too expensive.

Rains came, and as they fell, severe erosion took place along the slopes, in the ditches, and sometimes in the embankments. Out in the western part of the state where loessial soils stand 200 feet deep, the erosion was tragic. At least a part of the ever-increasing Mississippi River delta below New Orleans came from highway cuts in Iowa.

Destructive erosion was reflected in maintenance costs for ditch cleaning, for repair of washouts, and for lowered mower performance, where erosion was not severe enough to stop that activity altogether.

Iowa highway engineers believe that this business has gone far enough. They believe that they owe a certain heritage to those generations yet unborn; that it is their duty to prevent further loss of this nation's richest land; that it is their duty, in return for the privilege of using the land, to safeguard it.

### The Solution

Fortunately, the solution for Iowa is simple. Grass. Iowa, a land of sunshine and rain, of rich soil and rock, of native trees and flowers, is a place where vegetation for the most part is completely natural. Sow something and it will probably grow. By experimentation with exactly what will grow best and where, the roadside program is forging ahead.

Iowa engineers first began to con-

sider the highway an entire structure, from one right-of-way limit line to the other, back in 1934. A small-scale program got under way at that time. It has gradually increased in size. When the initial costs, added to the highway contract, have been protested by Iowa citizens, the Highway Commission has been able to point out a cost-benefit saving ratio always higher than 1.

Take the case of the 2-lane highway just south of Des Moines. It was built with no erosion provisions for the 10-foot sand shoulders, except for some pipe underdrains. For years every rain that came washed ditches in the sand shoulders, plugged up the underdrains, and eroded the backslopes in cut sections. Maintenance costs were prohibitive.

After much persuasion, maintenance crews shaped drain ditches at shoulder level, replaced excavated dirt with good topsoil, and laid the water courses up tight with sod. At no time was there ever any further damage. The costs of unplugging drains and filling holes ceased. Three years after this job was finished, the sod work was replaced by a concrete widening project which made it a 4-lane highway, using the shoulders. Even some of the maintenance men estimated that repair costs saved in the three-year period justified over half the cost of the erosion-control work.

The only solution to the erosion problem, with all its attendant cost and misery, is to treat the entire road as a structure, and to tie down the soil with good roots. To that end, Iowa recently outlined a broad policy with the following points:

1. That erosion-control work be made into a separate division on lettings so that it may be done by independent contractors and not necessarily tied to grading work. Also, it may or may not be advertised for bid at the same time as the grading work.

2. That the sodding, seeding, and mulching should be designed at the same time the rest of the work is designed, rather than after the grading work has been done, as a much better and more economical job can be designed in the first instance.

3. That as a general rule borrow pits will not be seeded, except in special cases which seem advisable to protect works lying below; also, that borrow-pit slopes be mulched if they are steep enough to cause erosion.

4. That the roadside-improvement engineer be given leeway to do the necessary work to control erosion and to protect the work done. In unusual cases the roadside-improvement engineer should consult with the district engineer as to the scope of work to be undertaken.

5. That erosion and roadside work be continued as a feature of design and construction on grading work in general; that those district and division maintenance engineers who are alert to the importance and possibilities of this work be commended; and that an effort be made to impress the urgency of this work on all construction and maintenance forces.

With these points in view, it is the policy of the State to do all roadside-development work by contract.


### Department Administration

Dudley Chittenden, Landscape Engineer, at present is administering the roadside program, assisted by George (Continued on next page)

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C. &amp; E. M. Photo

Dudley Chittenden, Iowa Landscape Engineer, looks over some mulched roadside slopes along an Iowa highway.

A. Robinson as chief inspector and by Worth Karns as a sort of inspector-agronomist. This small crew acts in an advisory capacity. It writes specifications, makes studies, and frequently goes out and actually sows seed where needed. The roadside department is rapidly working towards the day, however, when there will be a roadside man in each of the six districts, and a man on research.

Actual inspection of the shaping of slopes, seeding, mulching, and sod work is done by regular construction inspectors, acting under advice from Chittenden or his men. It is a satisfactory arrangement, ties in nicely with the chain of authority, and the jobs go in fine.

Specifications on this work are purposely being kept as flexible as possible, so contractors will be encouraged to experiment with the work and develop better methods. Then as improvements show up in the work, they can always be incorporated in later job specifications. For the roadside people don't feel they have a corner on all the answers, however well their finished work speaks for itself.

For example, early specifications suggested that sod be staked down with a piece of ordinary wood lath 12 inches long. One contractor developed steel pins made of steel reinforcing bars, which he could remove after the sod had set. Another got the idea of holding sod down with staked hog wire fencing—both schemes an improvement over the slow hand work in the early specifications.

#### Water Is Mortal Enemy

Whenever roadside engineers think of the purpose of their work, their mortal enemy, water, comes to mind. For water is the thing they are fighting. Without it, slopes would stay nicely graded after the grading contractors moved away. Their job shapes up therefore in terms of (1) types of soils, (2) rainfall, and (3) degree of slope. Depending on these factors, they will need to do seeding, mulching, sodding, or some combination.

Average backslopes in the state are  $2\frac{1}{2}$  to 1, with a few as flat as 3 to 1. Minimum backslopes of 2 to 1 occur in earth cuts, with a few of these places in foreslopes. However, 3 to 1 foreslopes are standard.

#### Mulching

Straw mulch for a bare slope has been found to be effective in erosion prevention for as long as two years. If Chittenden had to choose between mulch and seed on a slope, he would take mulch because some kind of vegetation would come up anyway, and in the meantime, the mulch would hold the slope.

There are places in the state where rains have fallen on slopes mulched up to a certain point. No erosion occurs on the mulched part of the slope. But where the slope is bare, little gullies and washes appear immediately.

Threshed wheat straw, rye, barley, and oat straw are all common to most

parts of the state, and the contractors buy this material usually by the estimated ton in a haystack. Most of the time a slope is mulched if it exceeds 5 feet in height. It gets the same treatment when it is below the figure, if

roadside engineers believe it will give trouble.

When rain falls on a mulched slope, the straw digs in. Fine mud washes in between the straw. The result is a forest in miniature, with the straw stems holding the earth in place. Slopes have been mulched in cuts 60 feet deep, and held. Until experiments with asphalt mulch can be carried out, Iowa intends to stick with this reliable old stand-by.

Mechanical straw blowers work fine if the straw is dry and of a uniform size. However, most of the contractors who do work for the State prefer to scatter the material by hand, believing that it gives a little better job.

Of all mulching ever done, Iowa has never found it necessary or even desirable to mix the straw in with the soil artificially. In 1946 the State contracted mulching of 738 acres at an average contract price of \$125.87 per acre. By 1947 the price had dropped to \$114.61 per acre on the jobs let the first half of the year. An average price of \$120 an acre seems to hold fairly

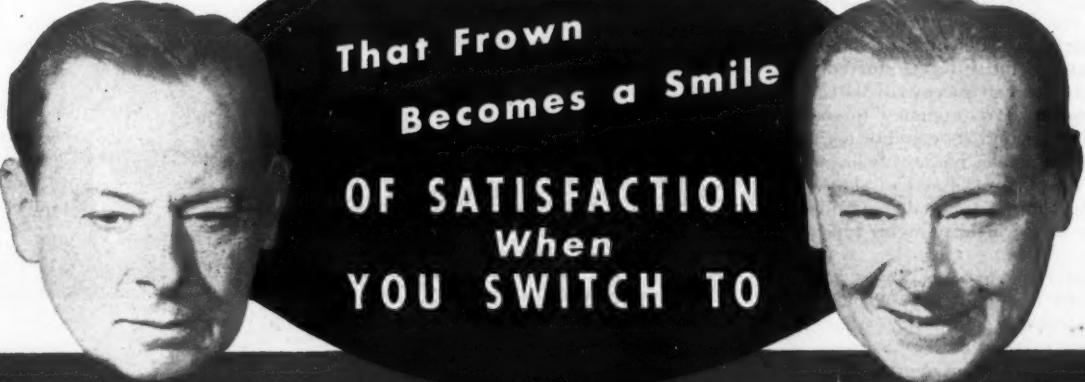
steady through rich and poor seasons.

#### Sod Is "Heavy-Duty" Material

When the roadside engineers want something that will hold the bottom of a ditch filled with running water, they choose sod. Some remarkable things have been accomplished with this material.

One sod ditch carried the run-off from a 112-acre drainage area without a failure. Another, built on a 57 per cent slope, drained  $1\frac{1}{4}$  acres successfully. Another on a 17 per cent slope carried water from 6 acres successfully. There have been cases where a sod ditch, feeding water to a concrete culvert or flume, held fast while the water at the lower end of the concrete washed the structure away. One 18-inch waterfall was observed on one job in the floods last spring, rippling merrily away from a sod lip. All over the state are sod ditches, giving about as good service as if they were lined with road pavement.

(Continued on next page)



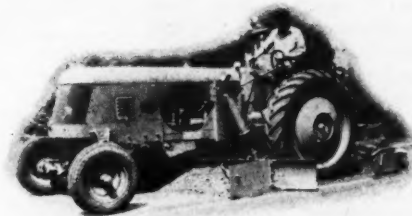
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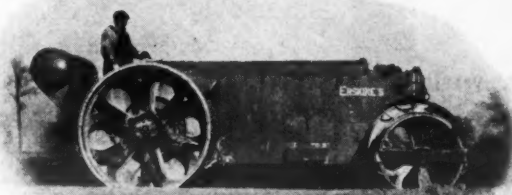
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## Erosion Control Is Aim Of Iowa Roadside Work

(Continued from preceding page)

There is undoubtedly a tenacious strength in those thousands of tiny roots. And it is a simple fact, as the Soil Conservation Service has been demonstrating for years, that the place to start flood and erosion control is in the grass roots.

The Iowa Highway Commission tries to make sod ditches some standard width, say 4, 6, 8, or 10 feet wide. But the building of each is an individual problem, with various factors to be taken into consideration for that particular ditch. Incidentally, Iowa leans towards field study and field design for roadside work, rather than any set rules or standards.

With generally good soil, the roadside contractors in Iowa are finding that sod cut just thin enough to clear the root mat will improve output, weigh less, and take hold in the new ground faster. The sod is cut usually in strips 15 inches wide, rolled up in a neat roll with the dirt side out, and handled like cordwood with the loose flap always on top of the bundle. One contractor placed sod last summer in very dry weather, but despite the parched soil not one roll broke: a tribute to the sod root structure. This kind of sod is always watered until it gets started.

Sod has been so successful that there might easily be a tendency to extend its use far beyond its capabilities. But so far that mistake has not been made. Where run-off is excessive or slopes are simply too much for sod structure to take, the State installs metal pipe and concrete drains.

Sodding costs average about \$5.50 a square, cut and laid in place. In 1946 Iowa contractors laid 30,339 squares at an average price of \$6.22. Last year the price went down to an average of \$5.39.

### Seeding Methods

The permanent force holding slopes and all manner of disturbed earth in place for all time is the crop of vegetation designed to cover the right-of-way to both fence lines. If this crop grows properly, the water in sod ditches will be clear during a rain.

Last year the State purchased 129,000 pounds of seed by contract. Since Iowa does not believe in sowing heavily, this amount of seed goes a long way.

The seeding season is best from April 15 to May 30 for grasses, and again from August 15 to October 1. At other times of the year, except when the ground is frozen, seeding operations are still carried on, but under a different procedure. The contractor prepares the specified seed bed and sows the nurse crop only. For this he receives 85 per cent of the contract unit price for seeding. Doing the work this way permits the mulching of the slopes, which is considered most important. After the winter season has passed, the seed grasses and legumes are sown in the spring without any ground preparation at all. The results have been excellent.

Chittenden is currently experiment-

ing a little more with this sequence of operations, but germination results on early-spring grass planting on slopes six months old have been excellent. In the meantime, a straw mulch holds the slope.

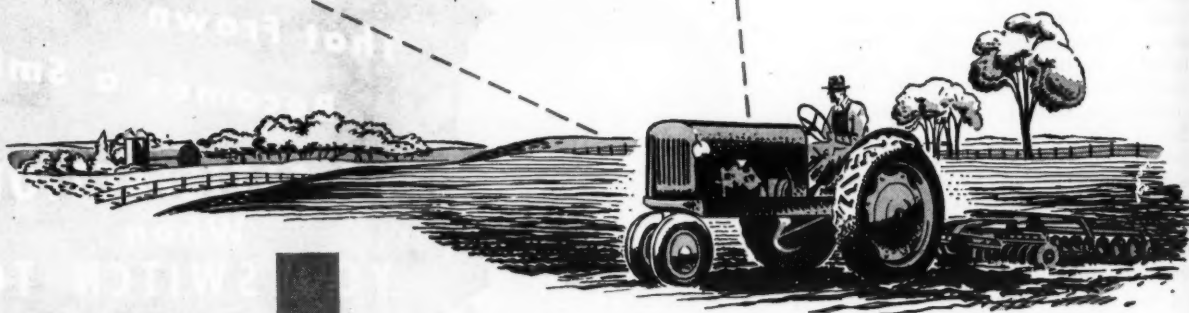
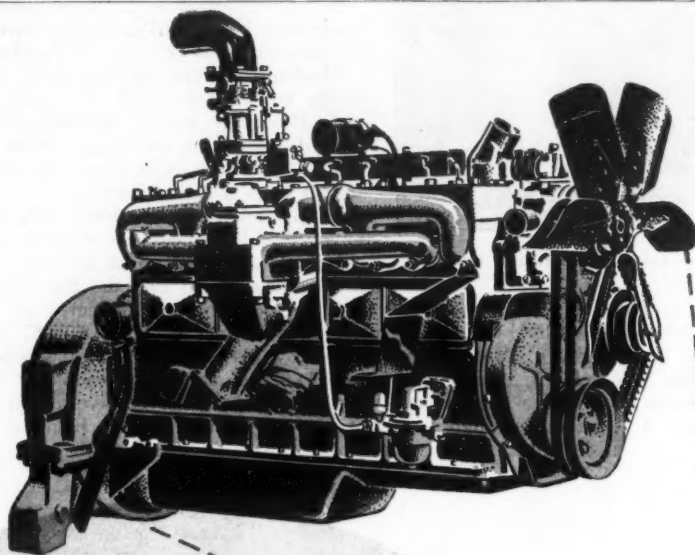
A good average seeding mix has been developed which works well in most

of the state. For each acre the contractors sow 15 pounds of brome grass, 5 pounds of alfalfa, 3 pounds of red clover, and 2 pounds of alsike clover. A combination of grasses and legumes works well under any condition.

In the sections where sandy soils are found, erosion is a serious problem.

There crested wheat grass or hairy vetch is a solution. Added to the standard mix, this dense grass stops water and wind erosion. Down through southern Iowa in the heavy clays, it looks as if fertilizer and lespedeza may be the answer. In the steep loessial

(Continued on next page)



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soils below Sioux City, western wheat grass in addition to the standard mix will take care of the situation.

All over Iowa, farmers are now beginning to be interested in roadsides. At no cost to the State they mow and harvest the hay crop growing there. Sometimes the State even gets a share of the material to use in mulching. One farmer threshed a stand of rye on a share basis, with the result that the State soon had 15 bushels of extra rye seed, free of charge, for maintenance forces to use.

Iowa policy tries to cure about 90 per cent of all erosion troubles with the initial contract. Routine maintenance can take care of the remaining 10 per cent as soon as maintenance employees—and engineers—become convinced of the importance of this work. After a job is in and has had a rain or two, that 10 per cent which may have been missed always shows up.

Low-growing grasses enhance the natural beauty of Iowa's roadsides, are very easy to mow once a year in any

places the farmers missed, and do not interfere with sight distances.

In 1946 the State seeded 2,411 acres at an average cost of \$33.56 per acre. Last year the average cost was \$26.09 per acre. Contrast this price with the days when grading contractors bid up to \$133 per acre for this item, "burying" pipe and other items in that cost. Putting roadside work on an independent footing has jolted prices down. Contractor competition is keen.

#### Trees

While Iowa has planted some trees in the past, it did not do so extensively. Policy generally favors a few trees on the roadside provided they are left in when grading is done. Chittenden points out that it takes 80 years for a native oak, elm, or hickory to reach maturity, and few of the highways will last that long. Therefore, in his opinion, the labor of pruning and the loss of mower efficiency would not justify trees. Carefully left in a roadside, however, and pruned occasionally, they

can be a fine asset to any roadside view.

Low-growing trees can be used where power or utility lines run down the right-of-way. The Bell Telephone Co. is cooperating nicely in Iowa in the trimming of any trees near its lines, and is not "butchering" whole tree-tops as is sometimes the case.

Always, in planning for trees along a roadside, Iowa tries to bear in mind (1) to what extent the scene will be enhanced, and (2) to what extent mowing will be slowed down.

#### Roadside Parks

At the present time plans are under way for the construction of about 200 Class 1 and 2 roadside parks. There will be also an indeterminate number of Class 3 turnouts. Class 1 roadside parks will have picnic tables, benches, a water supply, and toilets. Class 2 parks will have tables, benches, and either a water supply or rest rooms. These parks will be located throughout the state.

(Concluded on next page, Col. 4)

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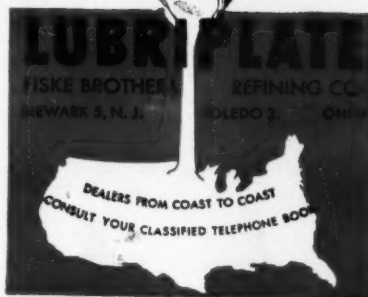


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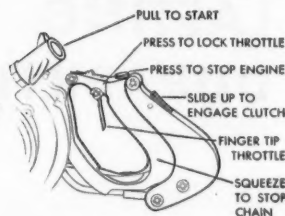


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Use the Disston ONE-MAN Chain Saw on any kind of cutting within its 18" capacity. You'll say, as so many others are saying, "It's a real engineering achievement." Examine its special features. 2-cycle, 3 1/2 h.p. (4000 r.p.m.), air-cooled engine with anti-friction bearings on all rotating parts... each precision built to within very close tolerances. Fuel meter gives automatic fuel feed and also acts as engine speed governor. Built-in automatic chain lubricator. Crankshaft type magneto, doubly protected against dirt and moisture.

Transmission gears run on anti-friction bearings. Clutch is positive, quick acting, manually controlled. Cutting chain of Disston Steel, fully interlocked. Replacable air cleaner. Magnapul starter. All these and many others combine to give you a ONE-MAN Chain Saw you can count on for dependable performance under all operating conditions.



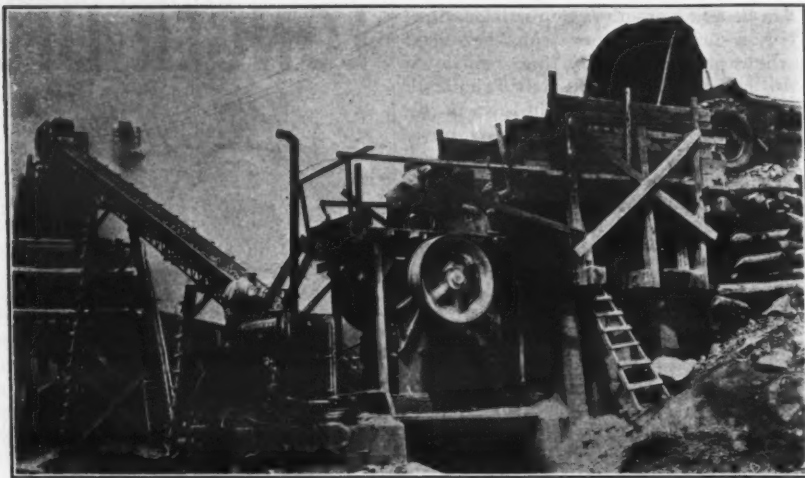
Write today for further particulars



Notching for felling. Note perfect balance because of design and position of handle.

HENRY DISSTON & SONS, INC., 574 Tacony, Philadelphia 35, Pa., U. S. A.





This Diamond rock-crushing plant is all-diesel-powered. On a job near Somerset, Ky., its daily output is 1,200 tons a day, of crushed rock in various sizes.

### All-Diesel-Powered Rock-Crushing Plant

A diesel-powered rock-crushing plant operated by H. D. Strunk has been producing a daily average of 1,200 tons of rock in various sizes. The plant is located outside of Somerset, Ky., about 75 miles south of Lexington. Its primary unit is a Diamond 24 x 36-inch jaw crusher driven by a General Motors 170-hp 6-cylinder Series 71 diesel engine. The crusher is fed from an overhead bin constructed with a ramp which permits trucks to dump their loads directly into the receptacle. Stone is delivered to the plant by two GM-diesel-powered Koehring Dumpsters fed at the quarry by a 3/4-yard diesel-powered Koehring shovel.

A Diamond 40 x 22-inch roll crusher takes its power from another GM diesel. The hammermill is powered by an In-

ternational Harvester 90-hp diesel. Two sets of screens are used: a Diamond 12 x 4 double-deck shaker screen for large stone up to 1 1/2 inches; and a Symons 16 x 4 double-deck vibrating screen for the smaller varieties. Conveyors and screens are driven by electric motors rigged to a 60-kw GM diesel-driven generator.

### Trailer Line Described

A bulletin on its complete line of heavy-duty trailers is being distributed by the La Crosse Trailer Corp., Funk Bldg., La Crosse, Wis. The line includes trailers in 23 models and 92 capacities ranging from 8 to 200 tons. These are made in full and semi-trailer models and with single or tandem axles. All semi-models can be converted by the addition of a La Crosse dolly equipped with a semi-automatic fifth

wheel.

The folder illustrates several typical models of La Crosse trailers, and lists their model numbers and the capacities in which they are available. Photographs show some of the uses to which these trailers can be put.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 92.

### Aeroil Products Co. News

Promotions of two members of its staff and preparations to move into new quarters have been announced by the Aeroil Products Co., Inc., 57th St. and Park Ave., West New York, N. J. This company produces a variety of oil, gas, and electric-fired machines for use by highway contractors.

M. M. Yarrington has been named General Manager and Fred C. Wittig, Assistant General Manager. The company plans to move to its new quarters in South Hackensack, N. J., about June 1.

### Erosion Control Is Aim Of Iowa Roadside Work

(Continued from preceding page)

#### Roadside Work Is Permanent

It appears that roadside development has grown up to full stature in Iowa. A highway official of that state explains roadside work this way:

"When I first started to work here, people raised Cain when we covered dirt roads with gravel. 'Too expensive,' they said.

"When we laid the first concrete pavement they objected again. Any improvement was criticized for being too costly. Commonplace things today were the common kicks of yesterday. 'Roadside engineering has come in for its share of skepticism, but this work is perhaps the most important of all, for it should remain after pavements crumble to dust. Safe under the turf will be the valuable soil of this great nation, the rightful heritage of those who follow us.'

"SOME BIG CONSTRUCTION  
JOB GOING ON DOWN THERE"

"YEAH! GOOD JOB, TOO!  
THEY'RE USING

**HELTZEL  
STEEL FORMS**

Airport, highway, sidewalk, curb and gutter, or whatever job it might be, there are sure to be Heltzel Steel Forms in the picture. You depend on Heltzel because their concentrated engineering has worked every detail to practical purpose. Each exclusive feature added has eliminated another problem for you.

Special Heltzel dual duty forms at Patterson Field carried the heaviest construction equipment ever supported by any forms. The same set of forms were used for both 21' and 25' slabs.



Heltzel Standard 1/4" Form

The same practical engineering that designed the special dual duty forms for the Patterson Field job is found in every Heltzel Steel Form. The standard form (illustrated above) is built to last, handle easily, and produce a better job. Moved from job to job, year in and year out, they set quickly, interlock smoothly, and strip away easily. They stay rigid because THE SINGLE WEDGE POCKET HOLDS STAKES FIRM—they can't vibrate loose.



Heltzel Steel Form & Iron Company, Warren, Ohio

Send me the following:

☐ B-18 Steel Highway and Airport Forms

☐ B-19A Steel Dual Duty Airport Forms

☐ A-20 Steel Forms for Curb and Gutters or Sidewalks.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

(Type of construction usually engaged in)

**HELTZEL**

STEEL FORM & IRON CO.  
WARREN, OHIO • U. S. R.

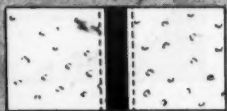
**FLEXCELL**

REG. U. S. PAT. OFF.

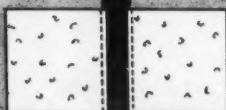
...first choice with engineers for

**LASTING  
DURABILITY**

**FLEXCELL JOINT  
IN CONCRETE**



**ORDINARY JOINT  
IN CONCRETE**



### CHECK THESE POINTS OF FLEXCELL SUPERIORITY

- ✓ Will not extrude under compression by adjacent concrete slabs—millions of tiny air cells permit compression without displacement.
- ✓ Resilient and re-expands when released from compression because of its wavy spring-like cane fibres. Cellular structure permits proper uniform compression.
- ✓ Durability proved by many years of actual use.
- ✓ Retains original shape while being installed, because of Celotex cane fibre board core. May be stored indefinitely. Light weight. Easily cut with hand saw.
- ✓ Adheres firmly to concrete. Provides neat finished joint.
- ✓ Made of special Celotex cane fibre board which is chemically treated during manufacture, making it toxic to fungi and termites. Protected against moisture by FLEXCELL PROCESS which coats each fibre with durable moisture-proofing compound.

**AVAILABLE NOW...  
PROMPT SERVICE**

Write for complete specifications and prices on Flexcell Bituminous Fibre Expansion Joint.

**THE CELOTEX CORPORATION**  
CHICAGO 3, ILLINOIS

**Heltzel**  
BUILDS IT BETTER

BINS, Portable and Stationary

CEMENT BINS, Portable and Stationary

CENTRAL MIXING PLANTS

BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)

ROAD FORMS (with lip curb and integral curb attachments)

CURB FORMS

CURB AND GUTTER FORMS

SIDEWALK FORMS

CONCRETE BUCKETS

TOOL BOXES

FINISHING TOOLS FOR CONCRETE ROADS



# Apron, Taxiways Added to Airport

## Improvements Also Include A Sanitary Sewer System, Deep Water Well, and New Drainage Facilities

THE Toledo, Ohio, Municipal Airport was recently improved under a \$324,544.10 contract awarded by the City of Toledo, Division of Engineering & Construction, to Launder & Son, Inc., also of Toledo. Completed under the contract were a concrete loading apron and taxiway; access roadways, parking areas, and other connecting taxiways of bituminous-concrete construction; a sanitary sewer system; a deep well and fresh-water system; and additions to the existing drainage system of the field. The work got under way in July, 1947, and was substantially complete by the end of the year. A small portion of apron and taxiway paving was completed about two weeks after the start of the 1948 construction season.

The Municipal Airport is located about 5 miles southeast of the city across the Maumee River in Wood County. It occupies a flat 513-acre site between the tracks of the Pennsylvania Railroad on the east, and those of the Chesapeake & Ohio on the west. The tract of land was used as a commercial airport, though still undeveloped, when the City acquired the field back in 1937. By 1939, through the instrument of the WPA, three new concrete runways were constructed to give the site a Class III airport rating.

No. 1 runway is 3,663 x 150 feet, and runs in a southwest-northeast direction. Crossing it like the letter X is the northwest-southeast runway No. 3, 4,243 x 100 feet. Across the intersection of these two runways is the 3,014 x 100-foot east-west runway No. 2. Four major airlines have regular operating schedules at the Toledo Municipal Airport.

### Deep Well

Heavy rains throughout the 1947 summer delayed the project at the start. But the drilling of the fresh-water well got under way early, as the contractor

planned to use the water from the well in mixing concrete for the apron and taxiway paving. The well drilling was sublet to the Dunbar Drilling Co. of Delta, Ohio, which moved its Bucyrus-Erie Model 22-W well-drilling machine to the site. To fulfill the requirements of the specifications that the well must supply 200 gallons of water per minute, the contractor sank a 10-inch-diameter well to a depth of 500 feet below the surface.

At the start a 14-inch casing was sunk through varied strata until rock was encountered at a depth of 47 feet below the surface. Within the casing a 10-inch pipe was inserted, and drilled an additional 10 feet into the rock. The space between the pipes was filled with grout, and the drilling continued until the required flow of pure water was obtained.

The new well, which adjoins the new administration building, supplements the existing 6-inch well now located at the center of the field. Underground pipes conduct the water to all parts of

the airport. In the contract the complete water system installed was listed as a single item, as was the installation of the sanitary sewer system.

### Grading

Unclassified excavation in connection with the grading for the field improvements totaled 16,480 cubic yards. This consisted chiefly of shallow cuts, and moving small quantities of earth from one part of the airport to another. The digging was not deep enough for a shovel to handle, so the material was generally moved with a LeTourneau LS Carryall holding an average of 9 yards of dirt, and pulled by an International TD-18 tractor. The haul lengths on what were mostly stripping operations varied between 100 and 500 feet.

On long hauls where it was uneconomical to use the tractor-scraper combination, the tractor was fitted out with a Bucyrus-Erie dozer blade. It then pushed the dirt to be moved into piles which were picked up by a Lima 3/4-yard shovel and loaded into trucks.



C. & E. M. Photo

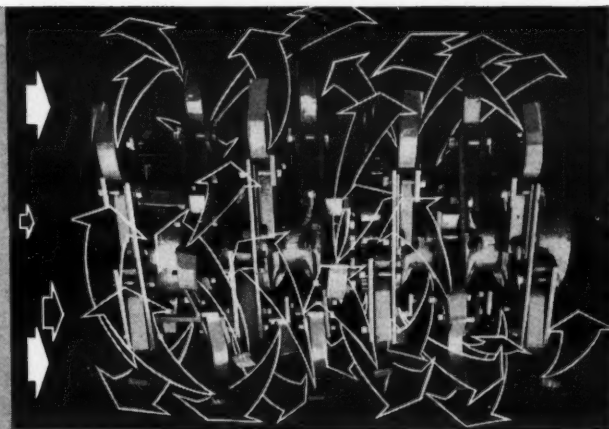
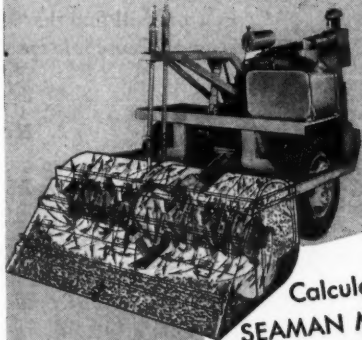
Dunbar Drilling Co., of Delta, Ohio, which sublet the well drilling on the Toledo Municipal Airport contract, moved in this Bucyrus-Erie Model 22-W rig to drill a 10-inch-diameter well 500 feet deep.

Three or four trucks, both contractor-owned and rented by the hour, were used to haul the dirt around the site on

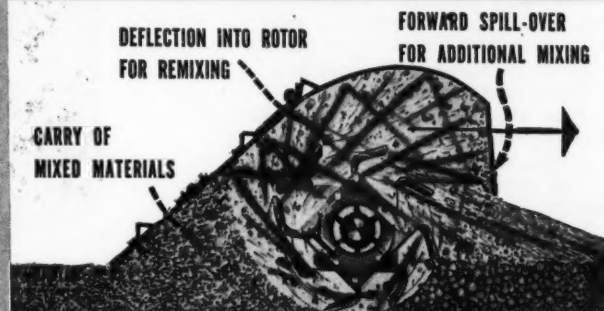
(Continued on next page)

## A SEAMAN MIX IS A SUPERIOR MIX...

because it provides  
*Positive, all-directional  
control*  
of material moving  
at high velocity!



Tines produce all-directional throw of materials and binder.



Repeated re-mixing cycle produces complete uniformity of mix.

Calculated with scientific accuracy, the tines of the SEAMAN MIXER are pitched, curved and staggered to give all-directional control in a high velocity throw of road materials and binder within the hood. At any given instant the tines create a cross-mix of portions sufficiently small to mix instantly. The flying materials are then deflected from the curved hood back into the mixing rotor and the forward spill-over for re-mixing.

This mixing and re-mixing cycle is repeated so often that materials in process are carried within the hood while the SEAMAN travels as much as thirty to fifty feet ahead. For this reason areas which are too rich or too lean in binder are "averaged out", — aggregate distribution is given uniformity with proper distribution of coarse and fines and a homogeneous, intimately mixed section is produced.

Over 15,000 tine contacts per minute account for the high tonnage of mixed materials produced by the SEAMAN.

Your ownership of a SEAMAN MIXER will give you "plant mix quality at road mix cost."



Thousands have sent for copies of "Soil Stabilization Methods" compiled by Seaman engineers. Have you sent for yours? Ask for Bulletin E25.

## HODGMAN Protection

INSURES  
CONSTRUCTION



• No. 3062 Waders — Sturdy, comfortable waders for construction workers and all who work in wet, muddy places. Made of strong jersey type fabric coated with a natural rubber compound. Seams, crotch and in-seam fully reinforced. Sturdy black rubber boots with cleated sole and molded heel. Suspender straps equipped with buckles.

WRITE FOR COMPLETE  
CATALOG OF PROTECTIVE  
CLOTHING.

**Hodgman Rubber Co.**  
FRAMINGHAM, MASS.

**SEAMAN MOTORS, INC.** MILWAUKEE 3, WIS.





C. &amp; E. M. Photos

## Apron and Taxiways Are Added to Airport

(Continued from preceding page)

haul lengths up to half a mile. A Trackson CT-9 swing crane with a dozer blade was also used for either piling the dirt, leveling it off, or backfilling the trenches. A Galion 10-ton 3-wheel roller compacted the fills.

### Pipe Work

An independent system of storm-drainage outflow was constructed at the east side of the field. Along the edges of the paved areas including roadways, apron, and taxiways, subsurface drainage was installed. This consisted of over 14,000 linear feet of 6-inch corrugated perforated asphalt-dipped steel pipe furnished by the Republic Steel Corp. of Canton, Ohio. A Buckeye Model 301 ditcher dug trenches for this pipe to an average depth of 31 inches and a width of 20 inches. The 20-foot lengths of pipe were installed by hand in the trenches which were 2 feet outside the edges of the paved areas. The trenches were backfilled with crushed stone, graded from 1-inch down to No. 4, to a depth of 4 inches above the top of the pipe, and with sand above that to the surface of the ground.

Additional concrete pipe was also laid to augment the existing field drainage system, and to draw storm water from the paved surfaces as speedily as possible. The Toledo Concrete Pipe Co. furnished the pipe which came in 10, 12, and 15-inch-diameter sizes. The water flowed into these pipes from 22 catch basins and 32 manholes, constructed to an average depth of 5½ feet. The last section of 15-inch pipe empties into Ayers Creek at the east end of the field beyond the Pennsylvania Railroad tracks.

Trenches for the concrete pipe were dug by a Buckeye Model 112 ditching machine to an average depth of 6 feet and width of 2 feet. Concrete for the manholes and catch basins was mixed in a Jaeger 10-S mixer.

All the work on the sanitary sewer system was sublet to the Comte Construction Co. of Toledo. New 8-inch lines were installed from the administration building and hangars to the new treatment plant at the field.

### Paving

At the south end of the airport, at the bottom of the X forming runways 1 and 3, is the new 150 x 750-foot 8-inch-thick concrete apron built on a slight arc. From the apron a 50-foot taxiway, also of 8-inch reinforced concrete, connects with runways 1 and 3. Another taxiway, of similar design, runs back from the apron to parallel the space already allocated for the construction of five new hangars. Total length of the 50-foot taxiway is 1,838 feet. One hangar has already been constructed, and the four remaining will be erected by the Fixed Base Operators who will use the field.

Connecting taxiways for these hangars are 25 feet wide of 7-5-7-inch reinforced concrete. The new entrance

driveway, 24 feet wide, has a reinforced-concrete section of 9-6-9-inch. Other taxiways for the Fixed Base Operators with their lighter planes, and the auto parking field, were constructed with a 5-inch water-bound macadam base; this was topped with a 2½-inch

surface course of asphaltic concrete. For the concrete paving a batch plant was set up at the field, and the materials

were mixed in a Ransome 27-E paver. On its part of the work Launder & (Concluded on next page)



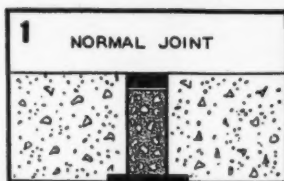
# KORK-PAK

*does a better job!*

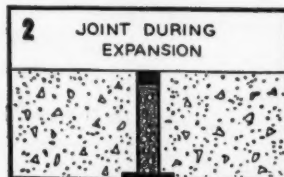
"Why **Kork-Pak**?" Because the improved **Kork-Pak** gives you 5 definite advantages:

1. **Kork-Pak is more fully resilient.** It has a greater recovery—between 80% and 90% as against 70% for ordinary fibre joints. The more fully the space below the seal is kept filled during contraction, the less danger exists of penetration of the seal by dirt, stones and other non-compressible material, which might cause a blow-up when expansion takes place.

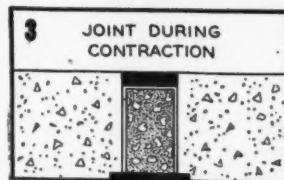
Contractors will find that less sealing material is needed when **Kork-Pak** is used because it keeps the joint more nearly filled.



KORK-PAK fills the joint fully at the time of insertion, and rests at the bottom on the premolded strip of Para-Plastic called Baseal. It is covered at the top with hot poured Para-Plastic.



During compression, as in periods of maximum concrete expansion, Kork-Pak will not extrude. It takes the full compression exerted in the normal joint and then recovers more than 80%.



During contraction, the higher resiliency of Kork-Pak permits a more complete filling of the joint than ordinary fibre materials, thus preventing large openings between it and the concrete which could become filled with non-resilient materials and cause a blow-up.

2. **Kork-Pak handles readily without breaking.**

3. **Kork-Pak absorbs less water**—only 8% by volume as against 15% for ordinary fibres.

4. **Kork-Pak is non-extruding.**

5. **Kork-Pak has the desirable characteristics of the more expensive joints combined with low cost.**



# SERVICISED PRODUCTS CORP.

6051 West 65th Street,

Chicago 38, Ill.

Son, Inc., used an average force of 15 men, under the direction of Clyde Launder, President of the firm.

A new administration building, 204 x 100 x 16 feet high, with a 20 x 200-foot lean-to is being erected by Robert E. Nesmith of Houston, Texas, for \$64,850. It is scheduled for completion this month.

#### Quantities and Personnel

The major items included in the Launder & Son, Inc., contract were as follows:

Excavation	16,480 cu. yds.
Reinforced-concrete paving, 6 to 9-inch	36,687 sq. yds.
Granular sub-base	4,260 cu. yds.
Macadam base, 5-inch	1,680 cu. yds.
Concrete pipe, 10 to 15-inch	5,242 lin. ft.
Corrugated-metal drain pipe, 6-inch	14,140 lin. ft.

The improvement project was carried out under the personal direction of J. C. Webber, Assistant Commissioner, and C. L. Piper, Commissioner, Division of Engineering & Construction for the City of Toledo. John H. Jewhurst is Director of Public Service and George N. Schoonmaker is City Manager.

#### Welding Designer's Guide

A guide for use by designers of welded construction has been prepared by The Lincoln Electric Co., P. O. Box 5758, Cleveland, Ohio. It features information on welding symbols and their proper use. It shows how to indicate the type of weld desired, its length, and other pertinent data necessary to the welder. The symbols used in this guide are those which have been adopted by the American Welding Society.

The guide describes arc-welding symbols for fillet, butt, and special butt welds; lists supplementary symbols for types of welds; and describes the application of dimensions to the welding symbols. It shows how to identify the side of the piece which is to receive the welding; it lists basic welding symbols; and it shows where the various elements of the weld are located on the symbols. It shows what each of the symbols looks like, and how it appears on a working drawing.

The guide lists several suggestions for better welded design; and also lists the properties of base metals and weld metals. There is a page showing practical applications of the AWS symbols. Engineering data cover safe allowable loads for fillet welds in shear, and a table shows the length of fillet weld needed to replace rivets of various sizes.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 83.

#### Asphalt Group Names Bugge

W. A. Bugge has been named Managing Engineer of the Pacific Coast Division of The Asphalt Institute. He succeeds Dan Miller, who retired at the close of last year.

Mr. Bugge was formerly District Engineer of the Institute in the Pacific northwest. The Portland and Seattle offices have now been combined into a single office at 1304 Fourth Ave., Seattle, Wash.

#### Porter Promoted by Huber

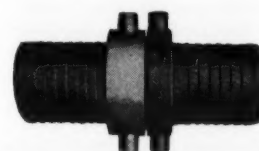
G. N. Porter has been appointed to fill the newly created position of Special Representative of the Sales Department of The Huber Mfg. Co., Marion, Ohio. Mr. Porter was formerly Manager of Huber's District No. 2, covering Ohio, Indiana, Michigan, Kentucky, and West Virginia. He will be succeeded by George A. Howser. Mr. Porter's headquarters will be in Marion, Ohio.

## For Quick, Tight Connections...on All Water Hose



**"KING" COMBINATION NIPPLE**  
With Patented "Cor-O-Zig" Corrugations

Fits straight end hose of same I.P.T. size; easier to attach because of smoothly rounded spiralled end; holds tighter under clamp pressure because zig-zag corrugations provide two-way gripping surface. Sizes  $\frac{1}{2}$ " to 10".



**"KING" SHANK COUPLING**  
For Suction and Water Hose

A reliable coupling that is absolutely uniform in quality, threading and dimensions. Quickly connected and disconnected. Made in all malleable iron; malleable iron with brass nut; or all brass. Shanks have deep, clean corrugations. Sizes  $1\frac{1}{4}$ " to 8".



**"KING" HOSE CLAMPS**  
Single Bolt Double Bolt

Strong, convenient, economical. Made of malleable iron, cadmium plated. Easily attached and can be used over and over again. Tightening provides evenly distributed all-round pressure on hose. Double bolt has exclusive quadruple take-up. All sizes.

Stocked by Manufacturers and Jobbers of Mechanical Rubber Goods

IF IT'S A **DIXON** PRODUCT

IT'S DEPENDABLE

**DIXON**  
VALVE & COUPLING CO.  
Main Office and Factory: PHILADELPHIA, PA.  
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## TRAILERS

Hughes New Low-Beds  
15 to 100 Tons

Used jobs also available

**MURRAY A. CLARK**

Box 426, Vineland, N. J.  
Phone: Vineland 1009

# BETTER JOINT PROTECTION

## with Servicised Para-Plastic

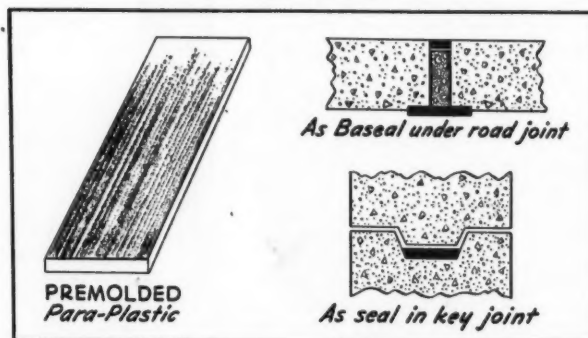
(Reg. U. S. Patent Office)

**Para-Plastic** enables you to meet satisfactorily practically every condition ordinarily encountered in connection with water seal, vapor seal, expansion and contraction in heavy construction—road paving, bridges, dams, reservoirs, spillways, tunnels, sanitary works, airport paving, underground electric terminals.

**Para-Plastic** is a formula containing rubber and other chemicals, with its own particular and distinctive characteristics. It was created specifically because practical construction experience has shown that ordinary asphaltic or tar sealing compounds may fail during certain phases of the expansion and contraction cycles. This experience also clearly showed what characteristics a material must have in order to form a complete water seal all year around, at all temperatures. **Para-Plastic** has those characteristics to an exceptional degree.

It is a rubbery, resilient, adhesive plastic which will adhere to steel, metal, wood, tile, glass, concrete and all forms of masonry. It is cohesive, as well as adhesive, and is therefore self-healing. It will not become brittle or hard at low temperatures from zero to 140° F, and in this range will maintain a positive bond, a continuous seal. The use of **Para-Plastic** establishes a new and better art in the protection of expansion and contraction joints against water infiltration.

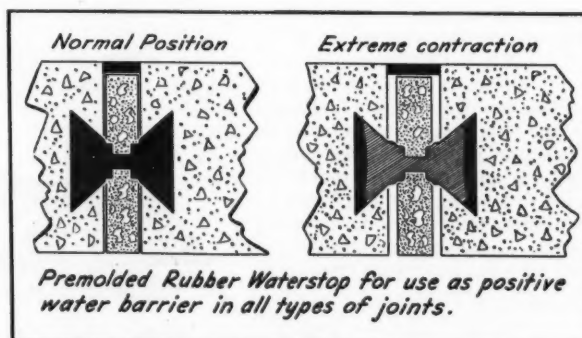
Write for literature and complete details on the other Servicised products which have been standard in this field since 1920.



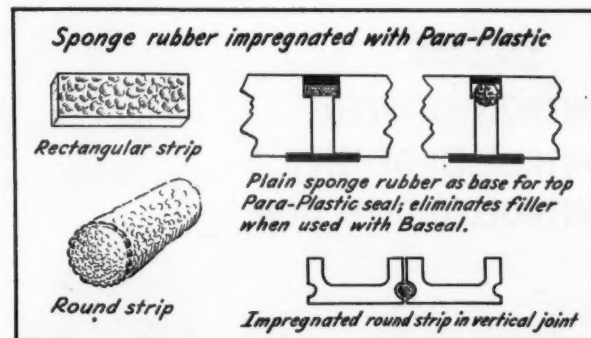
PREMOLDED Para-Plastic

As Baseal under road joint

As seal in key joint



Premolded Rubber Waterstop for use as positive water barrier in all types of joints.



Sponge rubber impregnated with Para-Plastic

Rectangular strip

Plain sponge rubber as base for top Para-Plastic seal; eliminates filler when used with Baseal.

Round strip

Impregnated round strip in vertical joint



**SERVICISED PRODUCTS CORP.**

6051 West 65th Street.

Chicago 38, Ill.



# Curves, Bridges Hamper Paving Job

**Contractor Fights Tough Conditions to Pave New Dual-Lane State Highway With 8-Inch Concrete**

♦ "DOGGED at every turn" is a saying apropos indeed in the case of J. R. Griffith Co. of Racine, Wis. For the best part of the 1947 working season this company fought with one of the trickiest concrete-paving jobs in Wisconsin—a 10.23-mile section of U. S. 14 centered around Bosstown. The job had seven curves on which the pavement crown had to be removed, and four highway bridges which had to be crossed.

Despite that formidable array of practical operating problems, the Griffith paving proceeded rapidly. The \$381,000 contract with the Wisconsin State Highway Commission was started July 15 and was completed in October, 1947.

The Griffith job replaces the old bituminous road laid down in 1927 with a newer, better-aligned section. It ties in at both ends with the old highway, of course, and was built largely on a new location. It included only five items connected with the preparation of roadbed, and concrete paving. The grading was virtually finished, under another contract, when the Griffith project was awarded.

## Modern New Pavement

The new pavement is 20 feet wide and 8 inches thick, with reinforcing only around the four bridges on the job. It is patterned after Wisconsin's 1947 model highway plans. It was laid with a 1½-inch straight crown from the center line to the edge of the pavement, with the exception of seven super-elevated curves, where the crown was eliminated.

With the exception of bridge approaches, the new highway contains no expansion joints. Thin ¼-inch sheets of asphaltic mastic, 2¾ inches wide, were inserted across the pavement every 20 feet to serve as contraction joints. A longitudinal strip of this material was also placed down the center line, in a continuous row. Mats of 24-inch round steel ¼ inch in diameter, with the bars 10 inches on centers, were laid in place during the pouring operation, midway in the slab and 4 inches down from the top of pavement.

While the subgrade soil is generally good, it was a "wet" grading job in



the clay sections and tough in the rocky cuts. So the old subgrade was covered with a layer of ¾-inch-minus aggregate sub-base as a part of the grading contract.

Finished shoulders on the new road are 6 feet wide, built of earth and gravel. This construction was held off until late in the autumn of 1947.

For all practical purposes, the concrete-paving part of this contract was perhaps as tough as any of the work.

## Subgrade Work Is Hard

Griffith moved in with about 2,400 road-feet of Metaform steel paving forms, planning to keep these set at least 600 to 1,000 feet ahead of the paver. A 15-man crew was hired locally to set, line, stake, and strip the forms. A Cleveland form tamper was brought in, and a Carr Formgrader excavated the trench under the base of the forms.

Almost immediately, however, the preliminary crew ran into trouble. Much of the subgrade and sub-base contained large and troublesome rocks. Since the preparation of roadbed for paving was one of the contract pay items, this difficulty was one which had to be licked.

The areas which gave the most trouble coincided with the big rocks, mostly buried but with perhaps 2 or 3 inches sticking up. A 14-ton Caterpillar D8 tractor was moved up on these locations. With one track holding on its brake, the "Cat" waggled and spun around over these places, grinding enough material loose off the top of the hard formation to give the subgrading machine a chance.

Assigning the D8 to this work was expensive enough, but not as expensive as a delay to the crew would have been, or a breakdown of the R-B Finegrader.

After the troublesome spots had been pulverized and ground to pieces under the "Cat's" tracks, the form trench was excavated to a string line, the forms set in and pinned, and their top elevation checked for alignment and grade.

Excess material was then removed by

Griffith Co. sent in a Carr Formgrader (left) to excavate form trench for its 10-mile Wisconsin paving job. While the labor gang in the center photo worries Metaform steel paving forms into place near a bridge transition, a batch truck in the background goes over the subgrader. In the other photo are Project Superintendent Frank Griffith, left, and Resident Engineer George Reiser.

an R-B Finegrader machine, traveling on the steel forms. Excess material was cast off to both sides of the forms outside the pavement location, and a Fordson 3-wheel steel roller was used to

smooth out the sub-base. This treatment did not complete all work on the sub-base, however, for another blade planer attached to the paver skimmed the

(Continued on next page)

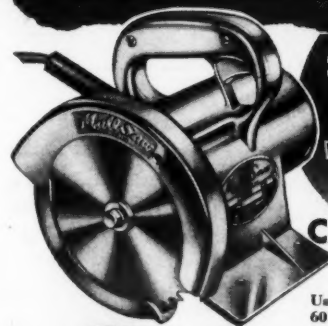
## TURF BY Scott's

Scott's Seed has the reputation of making better highway turf. You can always use Scott's with the confidence that it will meet the most exacting specifications for purity and germination. Write today for prices on your projects.

O M Scott & SONS CO.  
20 Park St., Marysville, Ohio



## Do Your ...



## SAWING SANDING SHAPING · GRINDING WIRE BRUSHING

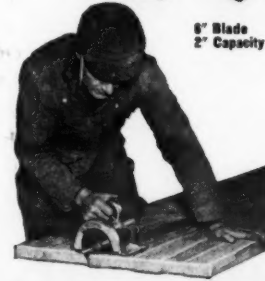
WITH A *Mall Saw*

## CUTS EVERYTHING From Wood To Steel!

Used as a hand saw, the Model 60 MallSaw will crosscut, rip or angle cut rough or dressed lumber, groove mortar joints, cut metal, cut or score tile, concrete and other aggregate compositions. When set in the sturdy portable floor stand, it serves as a table saw—complete with rip fence and miter guide; as a shaper for contour grooving, quarter round and tongue groove work; as a drum or face sander, as a wire brush or as a grinder. Also MallSaws with 2¼", 2½", 4½" capacities.

Ask your Supplier or write Power Tool Division for Catalog

**MALL TOOL COMPANY**  
7743 South Chicago Ave., Chicago 19, Ill.



★ Over 26 Years of  
"Better Tools For  
Better Work"

*Mall*

**PORTABLE  
POWER TOOLS**



## Hydraulic Sander gives

## CONTROLLED SPEED CONTROLLED DENSITY CONTROLLED DIRECTION

City, county and state highway departments use Hydro Spreaders because they provide the safe, sure way of sanding icy streets and roads. Easily installed on any dump truck with hydraulic hoist.

Material can be spread from 9 ft. to 35 ft. at speeds up to 30 m.p.h. All sprockets and chains are fully enclosed and material can be dumped over spreader without damage. One man can drive truck and operate spreader from cab.

An exclusive Hydro Spreader feature is the automatic gate opening device. When the driver starts the spreader the gates open and as the spreader is stopped the gates automatically close. There is no waste of material when spreader is not in operation. Hydraulic Spreaders are guaranteed to be free from defects in either materials or workmanship. Immediate delivery.

Write for illustrated folder.

Some Distributor Territories Available.

**Hydro Spreader Corp.** 247 Madison Street  
Waukesha, Wisconsin  
Phone: Waukesha 8040



ground again just ahead of the concrete bucket.

### Batch Plant in Center

The best spot for a batch-plant set-up on the project seemed to be approximately in the center of the job at Bosttown. There a quarry operated by Stewart Watson Construction Co. of Barneveld, Wis., was located. Limestone from this quarry was crushed, screened, and furnished in three sizes to the Griffith batch plant  $\frac{1}{2}$  mile away:  $1\frac{1}{2}$ -inch maximum,  $\frac{3}{4}$ -inch maximum, and limestone dust. The latter was used to augment the scarce sand supply in the region.

The batch plant consisted of a 50-ton Butler bin, divided in two compartments for the larger aggregate; a Butler 250-barrel cement bin on the job, and another at a railroad siding at Richland Center to transfer the material from railroad cars; and a Butler 50-ton sand bin. These three bins were set up in perfect alignment so a batch truck could drive straight through and pick up its load. The set-up did pose one disadvantage, though, according to Superintendent Frank Griffith. It worked the crane operator to death getting the right material in the right bin, for one of the compartments was always on a blind side from his seat.

The large sizes of crushed aggregate and the limestone dust were hauled in from Watson's set-up and dumped in piles near the bins. A Caterpillar D8 tractor with a Caterpillar bulldozer handled all material from the truck dump to the clamshell bucket.

Washed stream sand was brought in by rail from two sources: one at Prairie du Chien, and the other at South Beloit. Alpha, Lehigh, and two carloads of Universal cement were used. The cement, in bulk, was all the air-entraining type. It was shipped in hopper-bottom cars, transferred to the Butler bin, and trans-shipped out to the job from Richland Center. All washed sand and cement had to be hauled 20 miles one way over the U. S. 14 detour—another headache.

A Northwest crane with a 45-foot boom was used to clam the material up to the Butler bins.

The mix used on this particular project was quite interesting. It consisted of 35 per cent fine aggregate, 65 per cent coarse aggregate, plus cement. The mix was based on the use of 575 pounds of total aggregates, at a specific gravity of 2.65, per bag of cement.

Adjusted weights of the dry batch, per bag of cement, were as follows:

Sand	140.4 lbs.
Crusher fines	61.4 lbs.
$\frac{3}{4}$ -inch rock	129.4 lbs.
$1\frac{1}{2}$ -inch rock	240.1 lbs.

The materials were weighed at the batcher scales and dumped to the batch trucks. Trucking Contractor L. J. Smith of Milwaukee, using a fleet of new Diamond T 2-batch trucks, hauled the dry-batched material to the job. These trucks were rented on a batch basis. Operating rapidly, only six trucks were required on the shortest hauls, but more were needed on the longer ones.

The first 5 miles on the western half of the job was placed first, to a point about even with the batch plant. Then paving began on the eastern end, working west, eventually ending up at the batch plant to finish the project.

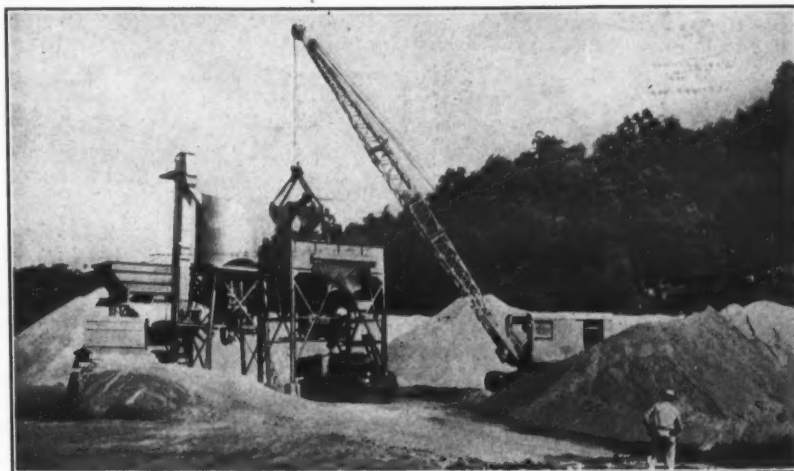
### Mixing the Concrete.

When the batch trucks arrived at the paver, they turned around about every 500 feet by means of two form sections left out that far ahead of the paver. A spotter was employed to direct the backing of trucks up to the skip of a Koehring 34-E single-drum concrete paver. This machine, spotted between the forms, carried a 35-foot boom and a dual-gate bucket.

The cement part of each batch had been given a light covering of sand at the batch plant, so when the trucks arrived at the paver the dumped batches tended to stick in the skip. A heavy weighted beater in the paver skip dislodged any recalcitrant cement in the batches, to let it slide on down the throat of the fast-working paver.

Batches were mixed 60 seconds inside the drum. They had a water-cement ratio of 6 gallons per sack. This gave a nice workable concrete mix, with a slump of about  $2\frac{1}{2}$  inches and from 3 to 4 per cent of entrained air.

Mixing water was just another exam-



C. & E. M. Photo

A Northwest crane loads a Butler sand bin at the batch plant which Griffith set up for its Wisconsin paving job. All three Butler bins for aggregate, cement, and sand were aligned so that batch trucks could drive straight through to get their loads.

ple of how this project was loaded with puzzling jokers. All the streams for miles around were found to be con-

taminated with acid from the famous Wisconsin cheese factories in the territory. (Continued on next page)



## Solves tough lubrication problem .....

## STANOLUBE HD Motor Oil

Heavy loads and excessive dust caused sludge troubles in the thirty concrete-mixing trucks of the Kansas City Quarries Co., Kansas City, Missouri. Fouling of truck crankcases and valve-galleries reduced operating efficiency, raised maintenance and repair costs.

All these troubles disappeared when this simple three-step program was adopted: 1) after draining, crankcases were flushed with Stanolube HD motor oil for a short run-in period; 2) crankcases were refilled with fresh Stanolube HD; 3) air cleaners and oil filters were serviced regularly.

Stanolube HD handles tough lubrication jobs—makes them look easy—because it is a true heavy-duty oil, possessing high stability and containing detergent and oxidation-resistant additives. Deposits due to oil deterioration are eliminated. Crankcase contaminants are held in suspension

until they are removed by the filter or drained out when the oil is changed.

These Stanolube qualities ended sludge problems for the Kansas City Quarries Company. The same qualities can provide clean, safe operation for your fleet engines. A Standard Oil Lubrication Engineer will help you test Stanolube HD motor oil in one of your fleet units. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

### SAFETY STICKERS



### Cut Down Accidents

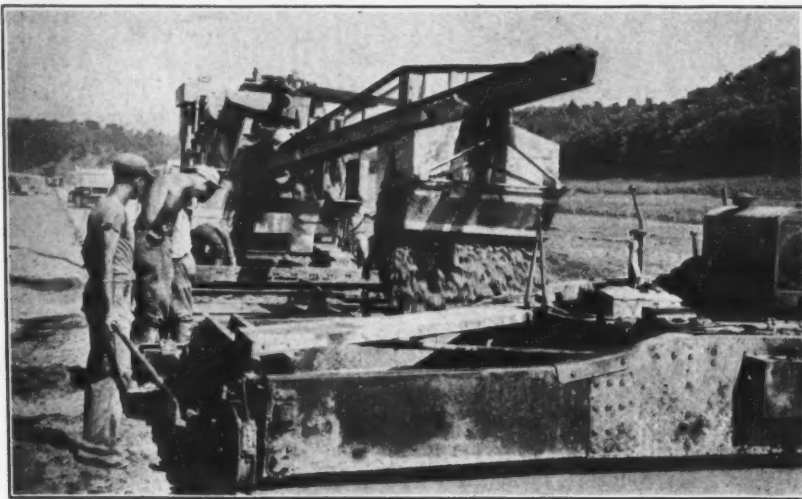
Place these self-sticking warning signs on your equipment where your workmen can't miss them. A warning word may prevent a serious accident. SAFETY-STICKERS are colorful, inexpensive and can be used anywhere. Write for catalog and price list. Put your safety message in front of your men.

The Howard Co. 1227-A, 20th Place, Hermosa Beach, Cal.

STANDARD OIL COMPANY (INDIANA)







## Curves and Bridges Hamper Paving Job

(Continued from preceding page)

tory, and the State Highway Commission would not permit this water to be used in the mix.

But Frank Griffith, Superintendent of the job, scouted around and found three clear springs within a few hundred feet of the highway. A 4-inch pipe line hooked to each of these sources of pure water led through the job. Ordinarily one spring was used at a time, depending on the location of paving. A C. H. & F. triplex and a Rex road pump kept the pressure up in the pipe line.

Water was taken at the paver through flexible rubber hose, with the pipe-line valves spaced about every 300 feet.

### Concrete Carefully Placed

The first batch of concrete was always dropped on the subgrade right behind the planer blade. Then as the paver moved forward, a strike-off blade leveled the batch into a ribbon 4 inches thick. A workman placed the longitudinal-joint steel in place as each location became ready.

Succeeding batches were run out towards the end of the boom and dumped along the form lines just ahead of the Jaeger-Lakewood concrete spreader. The Jaeger-Lakewood machine distributed the fresh concrete evenly throughout the width of the forms, and gave it its initial compaction.

The Jaeger-Lakewood spreader was tended by two laborers—in addition to its operator—who puddled the concrete

around the form lines and generally kept any excess material from slopping over the sides of the forms. They had a full-time job, because this machine was ordinarily busy.

Just behind the Jaeger-Lakewood spreader in the paving line-up came a Cleft-Plane joint installer. This machine cut the slots for the thin mastic strips for contraction joints, and left the material securely embedded under about  $\frac{1}{4}$  to  $\frac{3}{8}$  inch of concrete. The strips of mastic were covered by a tarpaulin on the deck of the joint installer to keep them as stiff as possible. Warm weather makes these strips soft, and it is then impossible to lay them in a straight line.

### Finishing Concrete

The concrete surface was finished mechanically by a Koehring Longitudinal Finisher, operating directly behind the Cleft-Plane machine. Excess mortar brought out to the side of the forms by this machine was dumped overboard, but good work by the Jaeger-Lakewood and Cleft-Plane machines ahead kept this excess material to a minimum.

Sometimes the concrete surface ahead of this machine was partially smoothed out by two finishers with long-handled steel straight-edges. Most of the time these men worked behind the Koehring finisher, however. Their straight-edges smoothed out the last vestige of irregularity in the slab.

The edges along the forms were shaped round by edgers, and a final finish of dragged burlap was put on. The finishers used a wood bridge so they could reach any tiny irregularity



C. & E. M. Photos

At left, a full bucket of concrete dumps on the subgrade of U. S. 14 in Wisconsin, as a Jaeger-Lakewood spreader moves up to distribute it. The overall view above, of Griffith Co. paving operations, shows men unrolling Sisalkraft curing blankets, the paving-machine line-up, and raw subgrade in the background.

in the slab out towards the center.

Concrete was cured by Sisalkraft curing blankets in 50-foot rolls. This paper was spread out and held down by a little sand or dirt along each edge.

It was left in place three days, and then moved ahead. Form pins were extracted by lever pullers and all forms moved ahead the day after a pour.

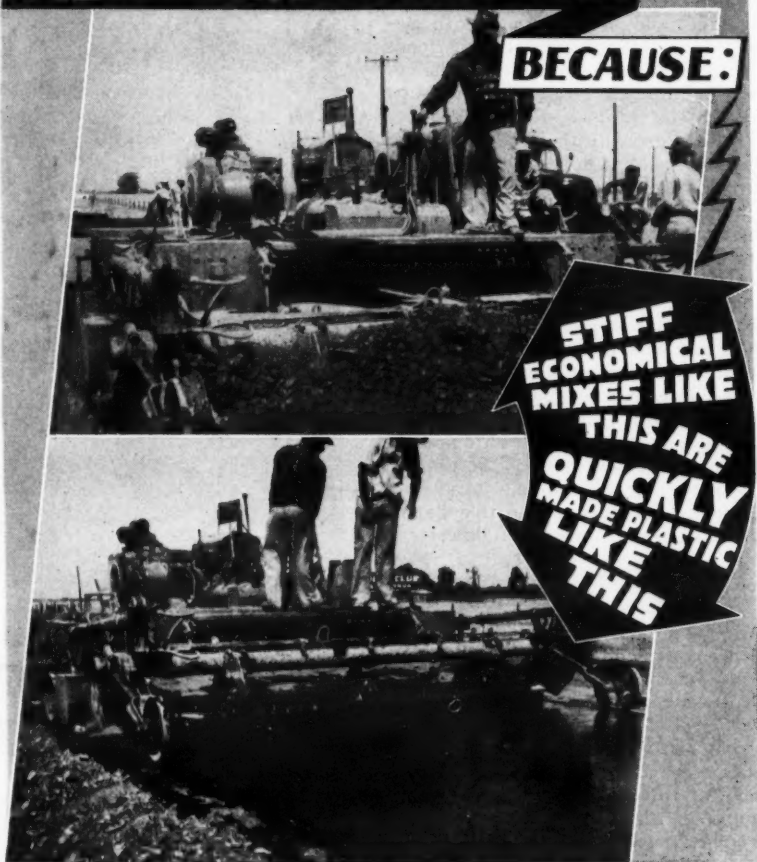
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## HIGHWAY ENGINEERS SPECIFY and CONTRACTORS USE

# The JACKSON VIBRATORY PAVING TUBE

BECAUSE:

STIFF  
ECONOMICAL  
MIXES LIKE  
THIS ARE  
QUICKLY  
MADE PLASTIC  
LIKE  
THIS



## DON'T BE LATE FOR '48! GET THESE ADVANTAGES!

Important savings in cement can be made. Finishing progress is much more rapid. Concrete at forms and joints is puddled perfectly. Spreading costs reduced. Complete compaction and excellent finish obtained with less labor.

The JACKSON Paving Tube is perfectly adaptable to slabs 6" to 24" thick, without affecting the efficiency on single or two-course standard plain or reinforced concrete pavement construction and may be quickly adjusted from 10' to 25' widths in the field. Power Plant mounted on the Finisher has ample reserve power through entire frequency range of 3000 to 5000 VPM. Finger tip controls. Quickly and easily attached to any standard finisher—and can be attached to the rear of standard spreaders to advantage for vibrating the first course in thick slab construction. One of the best investments in equipment a paving contractor can make. See your Jackson distributor or write for further information NOW.

Manufactured by ELECTRIC TAMPER & EQUIPMENT CO. for  
**JACKSON VIBRATORS, INC.** LUDINGTON, MICH.

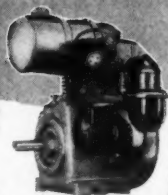
## Increase The PRODUCTIVE CAPACITY of Your Mechanized Equipment with WISCONSIN Air-Cooled ENGINES

If you build or use any kind of equipment that is or that CAN be successfully engine-powered — there is a fairly definite certainty that you can actually increase the productive capacity of the machine by motorizing with a Wisconsin Air-Cooled Engine.

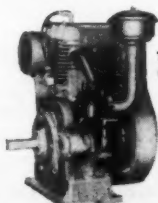
This rather broad statement is predicated on the fact that Wisconsin Engines are notable for continuous, high ratio power output as well as an absolute minimum of maintenance and servicing layups. In addition to the basic advantages of air-cooling, light weight, compact design and all-weather serviceability—you are assured of "Most H.P. Hours" of on-the-job operation, thanks to advanced engineering and heavy-duty design and construction.

Wisconsin Engines are worth looking into on all counts. Your interest will be heartily reciprocated.

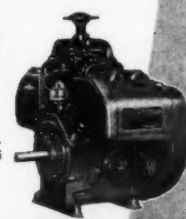
Typical 4-cycle single cylinder model, 2 to 4 Hp.



Typical single cyl. model, 4 to 9 Hp.



Typical V-type 4-cylinder model, 15 to 30 Hp.



**WISCONSIN MOTOR CORPORATION**  
World's Largest Builders of Heavy-Duty Air-Cooled Engines  
MILWAUKEE 14, WISCONSIN



While footage was not all that Griffith would like, the crew did manage to turn in some 1,100-foot records in 10-hour days. All this despite the tedious business around the approaches to all four bridges, and the trouble of making the mechanical transition from a 1½-inch to no crown on seven curves. Altogether it was the kind of road-building to test the patience of a saint.

Labor, too, was somewhat of a problem, due largely to absenteeism. In this particular part of the country, men are still very hard to hire, and this job was certainly no exception. Griffith kept quite a few more men on the payroll than the 80-man gang required for each day's run, just to have enough men on hand to keep everything operating. If more than enough men showed up, he usually put the best ones back on clean-up work where the paving was finished, just to keep them from running off. In his office was a high stack of checks, earned weeks before by men not even interested enough to come in and call for their money.

#### Personnel

Frank Griffith, General Superintendent, ramrodded the contractor's end of construction, assisted by Mixer Foreman Tom Williams and Master Mechanic Herman Teisberg.

The project was designed and supervised under the overall direction of Emmons L. Roettiger, State Highway Engineer for the State Highway Commission of Wisconsin, with Albert T. Bleck in charge as Construction Engineer. George Reiser was Resident Engineer in local charge of field work.

#### Portable Spot Welder

A lightweight self-operating spot welder has been made available by the Greyhound A. C. Arc Welder Corp., 606 Johnson Ave., Brooklyn 6, N. Y. It will weld metals up to ½-inch combined thickness. It is made in 110 or 220-volt models, and is supplied with 10 feet of electric cable. It is especially recommended by the company for quick welding jobs in hard-to-get-at places.

The Greyhound portable spot welder is enclosed in a compact non-corrosive cast-aluminum casing equipped with an integral aluminum carrying handle. It weighs approximately 23 pounds. The protruding copper arms come in lengths of 6, 12, and 18 inches. Replaceable alloy tips are available in an assortment of shapes for specific needs. Each unit has a silicon-steel and copper transformer wound with burn-out-proof spun-glass insulated magnet wire.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 1.

#### Data on Concrete Mixers

Data sheets describing various models of concrete mixers have been prepared for distribution by the Essick Mfg. Co., 1950 Santa Fe Ave., Los Angeles 21, Calif. The Essick mixers are made in sizes ranging from 3½ to 8 cubic feet. Individual sheets have been prepared for each model.

One sheet discusses the 3½-cubic-foot Model 350; another, the 6-cubic-foot Model 62A; another, the 6-cubic-foot Big Boy; another, the 8-cubic-foot



C. & E. M. Photo  
Two pumps, a Rex and a C. H. & E. triplex, furnished water to the paver on the Griffith job from clear springs a few hundred feet from the highway.

One Sacker; while others cover the Essick line of plaster mixers.

Each sheet contains a photograph of the model, lists its principal operational

features, and explains the advantages claimed for it. Also included are the mixer's complete specifications.

Copies of this literature may be ob-

tained from the company. Or use the enclosed Request Card. Circle No. 66.

#### Blueprint Machine

A blueprinting and developing machine is made by the Economy Blue Print Products Co., 1714 N. Damen Ave., Chicago 47, Ill., and the Reproduction Products Co., 12790 Westwood Ave., Detroit 23, Mich. The machine is equipped with a Hanovia-type printing tube and a revolving cylinder. It can be used with cut sheets or rolls.

Feature of the Direc-Liner is its "packaged" construction which permits 3-minute replacement of either the printing or the developing unit. If breakdowns occur, either unit can be replaced, thus eliminating the need for repairs at the machine's location in the plant. The ammonia-vapor method of developing is used with this machine.

Further information may be secured from either of the above two companies, or by using the enclosed Request Card. Circle No. 10.

## ALL THIS IN JUST 14 DAYS!

**WEAVER CRANE SERVICE, Inc.**  
**CHARLESTON, W. VA.**

traveled 750 miles over  
mountain roads — set 31  
underground  
storage  
tanks in

11 West  
Virginia cities with a single  
**MICHIGAN**  
**TRUCK-CRANE**



## ...half the time required by less mobile equipment!

Weaver Crane Service, Inc., operates throughout the state of West Virginia, placing and removing underground storage tanks for a nationally-known petroleum company. They are highly pleased with MICHIGAN'S truck mobility and stamina on the mountainous roads of West Virginia. In the words of Mr. Albert Weaver, "it has given exceptionally good service . . . Had this work been done with a less mobile machine, the same trip

would have taken at least thirty days . . . I am proud of my MICHIGAN Crane."

This is typical of the praise of MICHIGAN Shovel-Crane owners everywhere. Get all the facts about MICHIGAN — ask for your copy of "MICHIGAN ON THE JOB" which graphically shows the wide range of cost-cutting applications of these pioneer mobile shovel-crane.

## TARPAULINS

Low Prices—Immediate Delivery

Size	10 oz.	12 oz.	14.90 oz.	18 oz.
15x20	\$23.00	\$27.00	\$31.75	\$36.07
18x24	\$27.40	\$32.00	\$37.50	\$43.44

Freight paid on orders of six or more.

Other sizes available at  
corresponding prices.

**L. K. LIPPERT COMPANY**

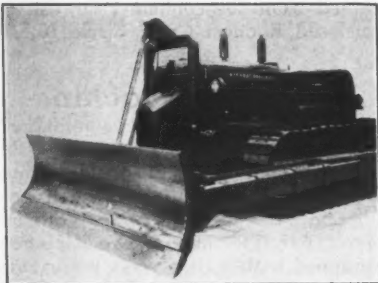
297 High St., Columbus 15, Ohio

# MICHIGAN

**MICHIGAN POWER SHOVEL COMPANY**

490 SECOND STREET • BENTON HARBOR, MICHIGAN, U.S.A.





Full visibility features the new Bucyrus-Erie Harvester designed for the International Harvester TD-24 crawler tractor. Other cable-controlled attachments now in production include a bulldozer, scraper, and ripper.

### Matched Equipment For Crawler Tractor

A line of attachments for use with the International Harvester TD-24 tractor is made by the Bucyrus-Erie Co., Box 58, S. Milwaukee, Wis. It consists of a Bulldozer, bulldozer, scraper, and ripper. Power for this cable-operated equipment is derived from a power-control winch. A front-mounted single-drum winch is used with the Bulldozer or bulldozer; a rear-mounted double-drum winch is used with Bulldozer, bulldozer, scraper, ripper, or other attachments. Both winches have planetary drive.

The Model B-250 scraper has a struck capacity of 22 cubic yards. The differential bowl and apron reeving is said to keep rope pulls low and yet to give maximum power at the start of the positive rolling ejection dump. The scraper apron can be converted from the conventional solid type to a hinged type. Other features claimed are double-curved cutting edges; front-mounted hoist tackle; and widespread rear wheels.

The Model CR-4 heavy-duty ripper is recommended by the company for breaking up tough-digging hard-loading materials. It has detachable alloy-steel standards, angled for best digging suction. The V-shaped rear end and the spacing of standards are designed to allow ample clearance for uprooted materials.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 53.

### Land-Leveling Equipment

Literature on its land-leveling equipment can be obtained from the Dawson Mfg. Corp., 8660 Atlantic Blvd., South Gate, Calif. A large broadside covers the Pacific Floatplane, and a single-page data sheet covers the Pacific No. 1 terracer.

The Floatplane is described as a trailer-type automatic land leveler, and is made in three sizes—6 x 20, 8 x 30, and 10 x 30 feet. The broadside features a large view of it in which its principal parts and their functions are pointed out. Text describes how the machine works, its uses, and its features.

The data sheet on the terracer illustrates the unit and includes a complete list of specifications and dimensions: the blade assembly, pressure and range, the lifting mechanism; the frame, operator's platform, axle, and tires; etc.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. For the Floatplane bulletin, circle No. 84; for the terracer, No. 85.

### Marion Representatives

John K. Dolan is the new sales representative for the Chicago district office of the Marion Power Shovel Co. This district covers northern and central Illinois, southern Wisconsin, eastern and central Iowa, and southwestern Michigan. Offices are located in the McCormick Bldg., 332 So. Michigan Ave.

John R. Hildinger is sales representative

for the territory of western Ohio, a large part of the southern peninsula of Michigan, and the eastern half of Kentucky. He will operate from the main offices in Marion, Ohio.

### Michigan Surveys Its Highway Needs

A survey of its highway needs has been completed by the State of Michigan. And according to the results obtained, nearly half of Michigan's 106,000 miles of highways and city streets have deteriorated to the point where \$1,400,000,000 must be spent to bring them up to date, and an additional \$700,000,000 is needed to pay for replacements and maintenance of thoroughfares which are presently considered adequate.

The survey was undertaken by the Highway Study Committee of the Michigan Good Roads Federation, with the assistance of the Federal Public Roads Administration. It took 18 months to prepare, and is one of the most thorough of its kind ever conducted in the United States. It is especially noteworthy in that it is the first time in the history of the state that all groups interested in good roads were able to reach an agreement as to actual highway needs.

All incorporated villages and cities, counties, and the State Highway Department were asked to submit a list of their needs. These needs were then screened by state, municipal, and county engineering committees which accepted only the absolute minimum requirements. Uniform standards were set up so that the same yardstick could be used to measure the various needs and to eliminate any partiality or guesswork. The results are said to be a set of facts over which there can be no dispute by highway users or builders.

The group estimates that the cost of bringing Michigan's highways and streets back to minimum standards would amount to \$179,141,000 a year if financed over a 12-year period, or \$158,444,000 a year over a 15-year period.

The Federation feels that substantial responsibility for financing local county roads, and local city streets should rest on the local tax structure. The report urges that present statutes governing distribution of state-collected motor-vehicle revenues to the State Highway Department, counties, and cities should be repealed and a new formula—based

on needs as set forth by the group—should be enacted.

### Swan-Finch Appoints Two

Two promotions have been announced by the Swan-Finch Oil Corp., New York City. Nelson V. Joyce has

been named Vice President in Charge of Purchasing, and John M. Parker, Jr., Sales Manager of the Tractor Division. S-F manufactures cutting oils, core oils, and maintenance lubricants under the brand names of Safco and Motul.

Buy U. S. Security Bonds

PATCH THOSE BEAT UP ROADS  
WITH THIS LITTLEFORD

UTILITY  
UNIT



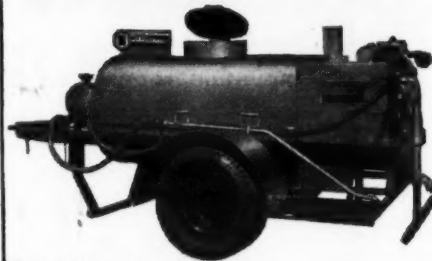
Pouring Pot Outlet



Hand Spray Attachment



When it comes to Road, Street and Highway Repair there's no unit that gives as much Utility as the Littleford No. 101 Utility Spray Tank. Here's a piece of Road maintenance equipment that will do any type of patch work needed. It has a Spray Bar for small application jobs, Hand Spray Attachment for patch work and a Pouring Pot Outlet for small patch jobs, crack filling and joint filling. Let's get our Roads back into shape—use the Equipment that will do all the maintenance jobs at lower cost—the Model No. 101 Utility Spray Tank. Write for Bulletin No. 5 for further details.



Model No. 101 Two-Wheel Trailer

"Tanker" Steam Heaters  
"Kwik-Melter" Roofers Kettles  
Trail-O-Rollers

MANUFACTURERS OF  
"Spray Master" Pressure Distributors  
Highway Brooms  
Tool Heaters  
Trail-O-Distributors

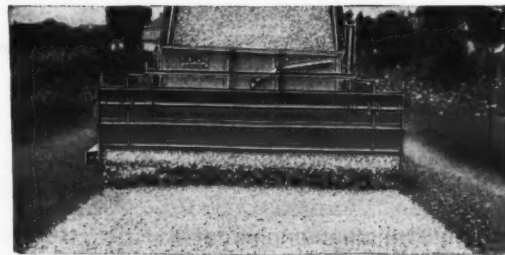
Asphalt Supply Tanks  
No. 101 Utility Spray Tanks  
84-HD Asphalt Kettles



**LITTLEFORD**

LITTLEFORD BROS., INC.  
485 E. Pearl St., Cincinnati 2, Ohio

**SPRING MEANS  
PLENTY OF ROAD WORK**



**BURCH EQUIPMENT MAKES IT EASIER**

For a year 'round, general purpose blade you can't beat this BURCH Tiltlev. You have greater clearance, positive, full hydraulic control. Fits any standard truck.

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# Reclamation Program: Its Plans and Problems

## Analysis Shows That Only Bureau-Contractor Cooperation Can Advance Huge Program Ahead

♦ THE Bureau of Reclamation is engaged in the largest construction program in reclamation history, Walker R. Young, its Chief Engineer, told members of the Associated General Contractors at its recent annual meeting in Dallas. And even larger programs appear to be ahead. The Bureau of the Budget, acting for the President, has sanctioned for the fiscal year 1949 a program almost 50 per cent larger than the 1948 program. This increase is essential to the efficient prosecution of the contracts now under way.

For the next five or six years, the Bureau's long-term program contemplates annual construction expenditures ranging up to \$400,000,000. With these demands in the offing, Mr. Young urged the contracting fraternity to prepare promptly, if it is not now ready, to handle this volume of work.

### Current Difficulties

There have been many difficulties for reclamation construction during the past few years—for both the Bureau and contractors, Mr. Young said. Labor, materials, and prices have been—and still are—construction headaches. On top of these conditions, some contractors have faced the unpleasant experience of being told that available funds for the project were exhausted. Yet in spite of this, contractors have done a good job.

But, Mr. Young cautioned, construction difficulties are apparently not at an end. Guessing at what materials will be available and at what price, forecasting wage rates, trying to figure out what can be substituted for scarce materials, getting enough labor, and obtaining reasonably efficient work—these problems, Mr. Young predicts, will be present in the next two or three years.

The obvious conclusion, Mr. Young said, is to see whether better ways of overcoming these obstacles can be found. The problem is aggravated by the prospective increase in size of the reclamation program. With this comes the necessity for keeping the various parts of the program moving along in step; development programs and those of the present must be geared together if they are to be really effective, he pointed out.

### Problem of Funds

One of the most vital current problems is that of lack of funds for carrying on projects now under way. This complication came about, Mr. Young explained, because construction on these particular projects went ahead much faster than the appropriations anticipated. Neither the Bureau nor the contractors could, or at least did, foresee this in time to adjust operations accordingly.

One way of avoiding similar occurrences in the future is to eliminate, or at least reduce, the earmarking of reclamation funds for specific features. At present, Congress does not appropriate money in bulk to the Bureau of Reclamation for its year's construction; it appropriates money for individual projects or parts of projects.

Under this system, if one part of the project advances more rapidly than another, the funds for that section may be spent and the work must then be slowed down or halted, since funds for another phase of the same project cannot be used to keep the work mov-

ing ahead.

There are various ways of avoiding this situation, Mr. Young pointed out. One is for Congress to appropriate the funds in bulk, but Mr. Young doubts that Congress would consider this desirable. Another would be to allow the Commissioner more latitude in transferring funds from one feature of a project to another. However, a more promising course, Mr. Young believes, would be to make an administrative allocation of funds immediately on passage of an appropriation act. Under such a system, the appropriation for a project or feature would be broken down to allocate so much money for administration, so much for right-of-way acquisition, so much to material

(Continued on next page)

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*That sleeping highway construction program has snapped out of its Rip Van Winkle and is going to work with its billion dollar muscles. And airports must be built with good solid concrete runways to handle the gigantic planes of today and tomorrow. Are you ready with Butler Ready Mixed Concrete Plants of greater capacities than ever before? You'll need them. Then for another business, remember Central Mixing Plants that are so "push button" your office boy could run them. And on your list—remember Bulk Cement Plants with smart new ideas. And—Batching Plants (Built by BUTLER, of course!) and Weigh Batchers so accurate you can weigh split hairs or an elephant and keep the love of the inspector. AND AS ANOTHER EXAMPLE OF BUTLER ENGINEERING, THERE ARE CONCRETE PRODUCTS PLANTS. There are more on the list—and complete information about them all. Just write for Bulletin 260.*

## BUTLER BIN COMPANY

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## Reclamation Program: Its Plans and Problems

(Continued from preceding page)

and equipment, and so much for contract payment.

Mr. Young put these questions to his contractor audience: would this method be useful to contractors in planning their operations? Would it make construction more efficient and economical? Would it reduce the area of doubt or difference of view between contractor and construction engineer? Mr. Young said that contractors' answers to these questions could be very helpful in working out improvements in present contracting practices, and, if necessary, in obtaining the needed additional legislation.

### Changing Costs

Another difficulty during the past few years, and probably for some years to come, is that of wage and price variation. Since the prospect for improvement in this situation is not very promising, the problem, Mr. Young said, is how shall the difficulty be handled.

He pointed out that escalator clauses had been included in Bureau of Reclamation contracts to provide for price and wage changes. But much controversy revolved around these clauses. Contractors themselves were undecided. At first they asked for them; later they wanted them eliminated. Now some are asking for them again—this time for materials as well as wages. And at this point, manufacturers and producers are involved in the question. They too want protection.

From the customer's point of view, however, there is an essential difference. The construction contractor, when he bids on a job, undertakes not only to assemble and manage a construction force but also to assume various risks, in return for which he receives broad freedom to manage the job in such a manner as to overcome the risks, Mr. Young stated. "Ordinarily the customer could himself undertake and manage the construction and carry the accompanying risks. This being so, he is not likely to be willing to assume all risk and at the same time leave the construction management entirely to the contractor. In fact, looking at the matter very plainly, the contractor when freed of contract risk is little more than a construction superintendent or manager."

Mr. Young went on to point out that to the extent that contractors seek to avoid the risk of wage and price changes, they in part divest themselves of their character as contractor. And he questioned the desirability of this out-

come. He then asked what can properly be done about those risks which are unduly large, such as the risks connected with inflation, with unrestrained price and wage increases, and similar problems. And he put the solution of this up to contractors.

### Length of Contracts

Somewhat related to the problem just discussed is the question of the most desirable size of contract, as measured by the required time of performance. Contracts extending over several years are likely to run into important changes in wages and prices. As compared with a short-term contract, the long-term contract means a higher bid price to cover the greater risk. The Bureau of Reclamation, Mr. Young said, is as much interested as the contractor in finding how best to determine the time of contract performance.

Generally, in the past, the Bureau has favored letting an entire job as a single contract. This practice tends to avoid interferences, allows the contractor to plan his work, makes it relatively easy to coordinate the several elements of the job, reduces costs, and saves time. On the other hand, where the job is so large as to require a long contract period, the single-contract plan entails the risk of ruinous price and wage changes.

To reduce the length of the individual contract, a job can be divided into successive stages. In this way, it is possible to reduce the length of time required for performance of a single contract to one working season, or at the most to two fiscal years. This would reduce the risk of drastic wage and price changes. Up to now, the Bureau has adhered to the single-feature contract covering the entire project. And in considering this problem one must keep in mind that some projects lend themselves to division into separate construction stages more readily than others. However, Mr. Young said, this general question of long-term vs. short-term contracts is one requiring further study, and urged contractors to do so and record their opinions.

### Agreements and Adjustments

Another problem of Bureau of Reclamation undertakings, which also has some relation to the question of long-term vs. short-term contracts, is the system of paying for the contract work. Payment on the regular estimates is not so much in question. Rather, it is payment on change and extra-work orders, which are necessary items in the execution of almost every contract; the adjustment of actual or potential disputes between the parties, including time allowance for delays; the effect of

unforeseen contingencies; and such problems. The release of the retained 10 per cent of estimates, disclaimer of liquidated damages, etc., are associated elements of complication.

Time is the troublesome element in disposing of these various difficulties. Mr. Young pointed out that the Bureau has never found a way to avoid changes and additions. And quite often, changes mean that the contractor must have more time to do the work. Usually, too, he incurs extra cost. Mr. Young invited contractors to contribute from their experience suggestions as to how to deal better with these problems.

He stated that for some time the Bureau has made consistent efforts to shorten the delay in contract adjust-

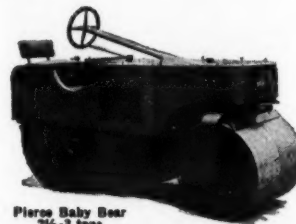
ments, and that it intends to continue those efforts. The most difficult points are two: agreeing on a fair price for changes or additional work; and obtaining complete data on the conditions involved in delays or other adjustments.

As to agreeing on a fair price, Mr. Young believes that the difficulties will be reduced if the contractor will realize that he is entitled to the cost of the work plus a fair profit. But he should not expect an undue profit. He may have lost money on other parts of the work, but he cannot claim an excessive price for added work to compensate that loss. The construction engineer and the contracting officer are duty-bound to oppose and deny such claims.

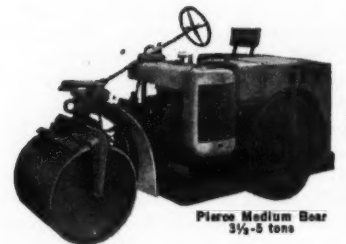
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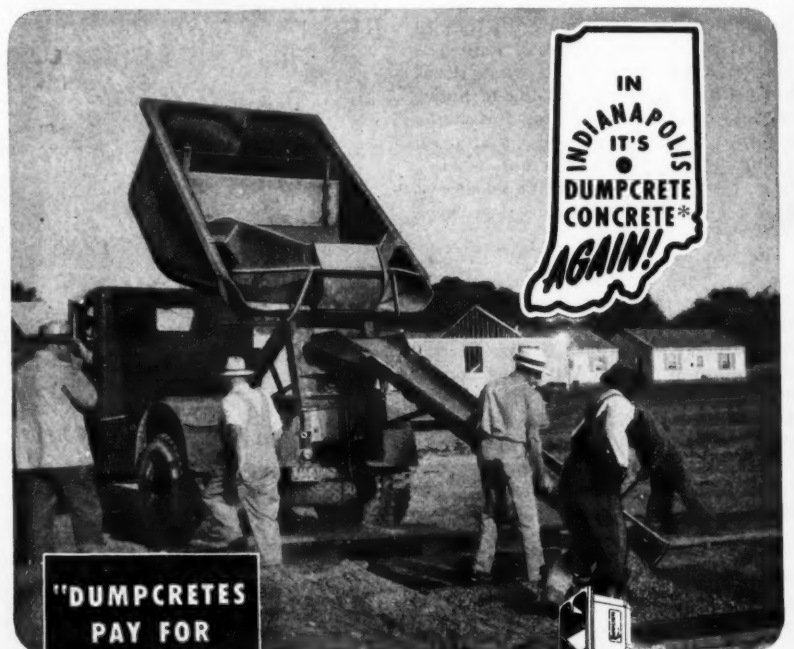


Pierce Medium Bear  
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The new 2½-3-ton Pierce Baby Bear is designed for close-in work and small area maintenance. It works against a curb up to 25 inches high and within 1½ inches of a higher wall or building. Final drive is within the rear roll. Use Pierce-Bear Tandem Rollers for all-around performance. Write for folder.

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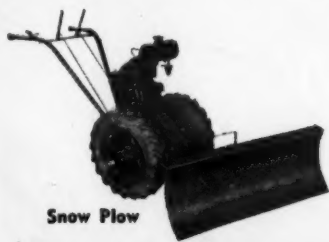
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he stated.

In the preparation of findings of fact preparatory to a settlement, Mr. Young suggested that the contractor can shorten the required time by presenting full facts as the basis of the findings. Too often, material facts are incomplete or reported in a conflicting manner, with the result that weeks or even months are required for the final issuance of findings.

Mr. Young pointed out that, while the Bureau has no desire to withhold money due a contractor, there are rather definite limits to what the Bureau can do in facilitating payments. The requirements of law and of the contract control the action of the contracting officer.

#### Form of Contract

Contractors' criticism of construction contracts was also touched upon by Mr. Young. He pointed out that the Bureau of Reclamation uses the standard form of Government contract. If, he said, this contract contains provisions which seem harsh or unfair from the contractor's point of view, it must be remembered that all its provisions were adopted in order to provide the necessary minimum of safety for the Government, by plugging some loophole that had been revealed by earlier claims or court decisions.

It is important to note, he added, that the Bureau cannot, on its own volition, change provisions which a contractor may consider objectionable. For they are a part of the standard Government contract which practically all Federal contracting agencies must use. Revision of this standard form can be authorized only by the Treasury Department which is charged by law with the responsibility of standardizing the forms used in Government contracts.

#### Specifications

Though many of the construction difficulties discussed by Mr. Young are still awaiting solution, he was able to report progress on one problem—that of specifications. He said that the exchange of views on this subject between Bureau engineers and contractors had been both illuminating and helpful; that the area of difference of opinion had been narrowed down; and that there are good prospects for further progress in the future.

In addition to many changes in specifications made at the suggestion of contractors, he announced that the Bureau had just recently established tolerances on line, grade, and surface of concrete construction and earth work. This should eliminate doubt on the part of the contractor concerning what he will be asked to do. It will also eliminate doubt on the part of the construction engineer as to whether he is getting adequate performance.

The Bureau has defined different kinds of concrete finish, to the same purpose. It has discussed the compaction of fill around structures, and while thus far final conclusions have not been reached, they are hoped for soon.

#### Cooperative Effort

In his conclusion, Mr. Young emphasized the importance of cooperation between the Bureau of Reclamation and contractors, for the overall advancement of the reclamation program. He pointed out that together they have solved some great difficulties in the past; that there are still many in the present and the future.

One essential is clear, fair, workable contracts, and proper handling of contracts. It is the business of the Bureau and the contracting industry, working in cooperation, he said, to make consistent endeavor towards that objective.

"I am convinced", he concluded, "that a strong competitive contracting industry is vital to sound construction results, and it is our constant endeavor

to so adjust our contracting practice as to foster such development of the industry."

#### Course in Construction Sponsored by AGC Chapter

The Carolinas Branch of The Associated General Contractors of America, Inc., has announced its intention of raising money to encourage a course in construction at the North Carolina State College. An Endowment Fund Committee is engaged in raising about \$100,000.

The object of raising the fund is to provide money to supplement the salaries of competent teaching personnel. At the present time, there are only about three or four engineering schools whose curricula include such courses. The contractors of the branch feel that such courses are necessary and desirable if contractors are to be able to secure good men when they need them to occupy key positions in their organizations.

The course will provide practical instruction in such matters as industrial management, business organization, construction planning, estimates and costs, construction methods and equipment, management and labor relations, and public relations.

#### New Truck-Loader Catalog

A catalog which describes a recently introduced truck loader is being distributed by the Shoveller Corp., 36 Warren Ave., Portland 5, Maine. The S-C Truck-Loader obtains its power from the traction of the truck's rear wheels. The bucket is raised through a specially designed hitch and lever arrangement. The unit's operation is controlled by the driver of the truck on which the hitch is attached. This hitch attachment is available to fit most dump trucks.

The folder lists thirteen features claimed for the S-C Truck-Loader. Photographs show how power is obtained, how the bucket is raised and dumped, and other features of operation.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 75.

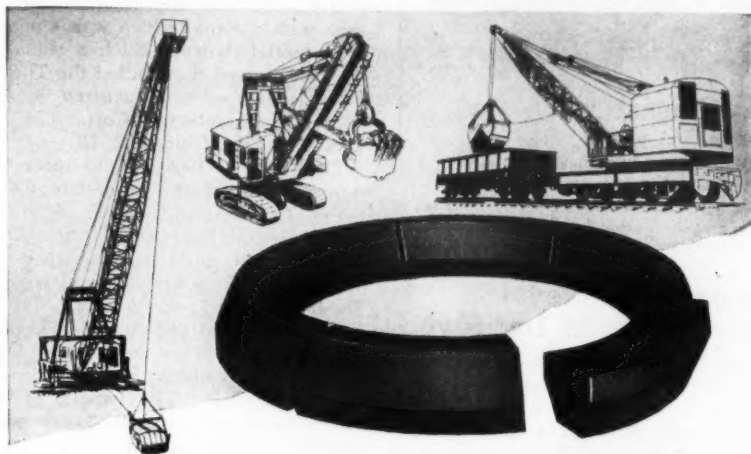
#### Airco Departments Merged

The Air Reduction Sales Co. of New York City has merged its Apparatus

Sales Department and Arc Welding Sales Department into a unit to be known as the Equipment Sales Department. Dale D. Spoor is its Manager. He is assisted by Ira B. Yates as Manager of arc welding and supplies sales, and J. F. Carroll as Manager of apparatus sales.

#### Asphalt Co. Moves to Ark.

The Berry Asphalt Co. announces that its main office has been moved from Chicago, Ill., to Magnolia, Ark. However, lubricating-oil sales will continue to be represented from the Chicago office, located at 120 S. La Salle St.



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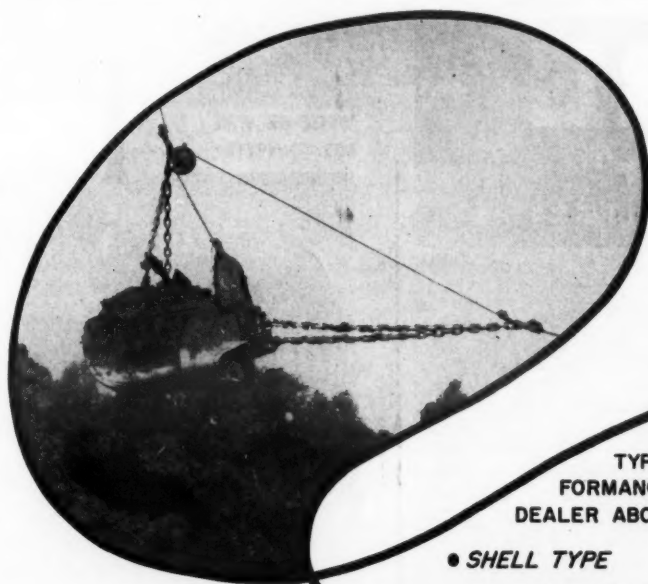


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Ten new improvements have been incorporated in the David White Model 3000 transit-level shown here.

### Transit and Level Model Is Improved

Several changes in its Model No. 3000 universal transit-level have been announced by the David White Co., 315 W. Court St., Milwaukee 12, Wis. This instrument is especially recommended by the company for building and construction work and for survey and check-up operations on building and road construction.

The vertical arc on the Model No. 3000 has been increased from 3 to 4 inches, with vernier readings to 5 minutes. Its location has been changed to under the clamp and tangent screw. The telescope axle now has a permanent bearing hold-down adjustment, said to last the lifetime of the instrument. Accuracy under severe temperature changes is insured by a solid spindle with tapered end thrust in the ball-bearing race, the manufacturer explains. The only bearing is on this race and the tapered end thrust.

A special adjustment has been added to the lock levers for locking the instrument in a level position. The White transit is provided with coated lenses for giving sharp definition under adverse conditions. The clamp and slow-motion screws provide both horizontal and vertical movement for fine adjustment. Sensitive level vials are placed under the telescope and in the instrument base, the latter for use when the telescope is in the transit position. The base is 3½ inches in diameter and eight-thread—standard on most instruments. A plastic trivet plate is furnished and can be screwed on the base of the instrument when it is used on a

stone foundation. A large shifting base permits the instrument to be moved ¾ inch without moving the tripod.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 55.

### Flashing Red Beacon

It is important to protect any unsafe area with a signal which warns people of potential danger. Such a signal is the flashing red flare called the Thoro-Flare, which is manufactured by the Signal Manufacturing Corp., 624 So. Michigan Ave., Chicago 5, Ill.

This light is designed to meet the requirements of the Interstate Commerce Commission and is listed by Underwriters' Laboratories, Inc. The portable light starts flashing when the unit is picked up by its metal handle. The beacon's red neon light is said to be clearly visible at distances of 500 feet. A Fresnel lens keeps the beam of light in a horizontal plane so it can be seen in any direction. The battery of the Thoro-Flare will run 100 hours on a standard 6-volt lantern battery, says the manufacturer, and longer if used intermittently. The brilliancy of the light is said to be unaffected by battery depreciation.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 42.

### Rod for Mild Steels

A rod for use in welding mild steels has been developed by the Air Reduction Sales Co., Dept. 1815-P, 60 E. 42nd St., New York 17, N. Y. The Airco No. 387 arc-welding electrode is listed in the E 6012 class and is available in ⅜, 5/32, 3/16, and ¼-inch diameters.

It is designed to operate on ac or dc, to yield a smooth bead of the proper contour, to have a minimum of spatter, to operate in all positions, and to yield a slag which is easily removed.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 7.

### Spex for 7½-Hp Engine

A folder on its lightweight gasoline engine has been prepared by the Aerolite Engine Co., Inc., 52 Wall St., New York, N. Y. The Model A7.5 is a 4-cycle air-cooled engine rated at 7½ hp. It weighs 65 pounds.

A complete list of specifications is

accompanied by a drawing which shows the principal dimensions of the unit. Photographs reproduced in the folder show the Aerolite engine with and without clutch. Also included in the new folder are power curve and descriptive applications.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 74.

### Chicago Facilities Unified

Consolidation of its Chicago facilities has been announced by The Yale & Towne Mfg. Co., Philadelphia, Pa. This move will unify all sales and service facilities in one office, located at the Railway Exchange Bldg., 80 E. Jackson Blvd., Chicago. Arthur H. Dobler, Regional Manager, will be in charge.

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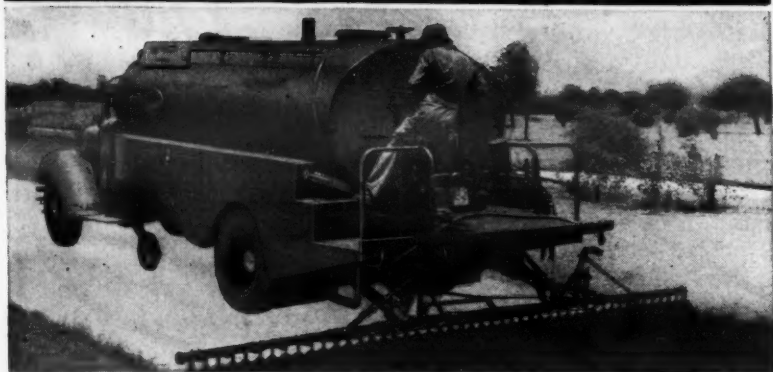
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# Relocating Old Road Gives Safe Alignment

## Bad Curves Eliminated on 7-Mile Grading Project; Two Contractors Each Have Section; Paving Next Year

PRESENT State Route 37 north of Bloomington, Ind., is a tortuous macadam pavement with widths varying from 18 to 20 feet. Accidents are not uncommon on this twisting highway, especially in the autumn when football crowds race down the 52 miles from Indianapolis to see the home games of Indiana University, which is located at Bloomington. The State Highway Commission of Indiana is now building a new State Route 37 to correct this dangerous situation. Grading has been completed on a 7-mile stretch beginning just north of Bloomington. The improvement is on new location, from 1 to 1½ miles west of the old road. Later on, a 22-foot concrete pavement will be laid over the new roadbed.

Two contractors each had a part of the new work which included only the grading and drainage structures. The north 4.2-mile section was under contract to the John F. Bloomer Co. of Appleton, Wis., on a low bid price of \$400,619.07. Adjoining on the south was the 2.8-mile contract of Ralph Rogers Co. of Bloomington, Ind., which was secured with a bid of \$268,000. Both contractors started work on the project in September, 1946, and finished their contracts last autumn.

On August 12, 1947, the Highway Commission awarded two additional contracts to extend the new alignment northward until it meets the existing route about 3 miles south of Martinsville. Martinsville is 22 miles from Bloomington. Between Indianapolis and Martinsville the present highway has flatter curves and less-steep grades than the section now being reconstructed.

### New Roadbed

The new road will have a minimum width of 44 feet between the outside edges of the shoulders. Down the center of the roadbed a 22-foot concrete pavement will eventually be laid, 7 inches thick at the center and 9 inches at the edges. The wide 11-foot shoulders will slope 1 inch to the foot. Included in the future paving contract will be an item for the contractor to cut a swath in the roadbed the width of the pavement, 5 inches deep at the center to 6 inches at the edges. This trench will then be backfilled with granular material as a subgrade treatment for the concrete pavement.

Where the fills are 5 feet or less, the side slopes are 4 to 1; over 5 feet they are 2 to 1. In cuts up to 2 feet the slopes are 4 to 1. This angle is gradually sharpened until a 2 to 1 slope line is reached for cuts 10½ feet deep and over. In rock the slopes are ½ to 1.

In one section where a maximum grade of 4 per cent is required for a distance of 3,700 feet, the roadbed is widened to permit the construction of a third traffic lane. Slow-moving trucks going up the hill will use this outside lane and thus leave a lane open for faster-moving passenger cars. This hill section is all straightaway alignment. The sharpest curve on the project is 2 degrees.

### Northern Section

On the north John F. Bloomer Co. contract, the clearing was done in the autumn of 1946 through a combination of hand work and dozers. A contract to build seven reinforced-concrete box culvert drainage structures was subbed to J. L. Wilson of Bloomfield, Ind. Four of these were completed in 1946, and the

remaining three last spring. As this contract had a solid-rock excavation item of 102,478 cubic yards, the contractor put in a busy winter getting out a goodly portion of this material. The rock was mainly limestone and shale, crossed frequently by clay seams.

Equipment for the rock excavation was all new. Blast holes were drilled by two Worthington wagon drills, each driven by a Worthington 315-cfm compressor. In the beginning some rock was taken out in 24-foot lifts, but this was later changed to a 12-foot maximum for more efficient operation. Both Timken drill steel and bits were used. The 1¼-inch round steel started in 6-foot lengths and was increased in 6-foot increments. Bit sizes started at 2½

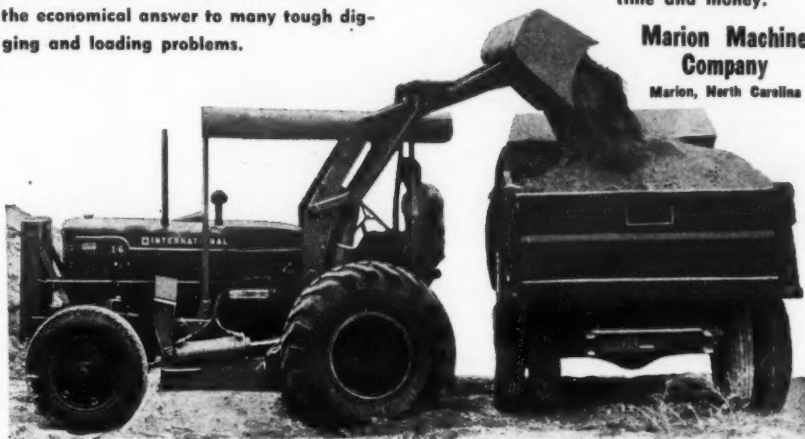
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## MARMACH LOADER Now Available for International Wheel Tractors

The fast, efficient MARMACH LOADER is designed for International wheel tractors. Built for durable, heavy-duty service, it is the economical answer to many tough digging and loading problems.

See your local International Industrial Dealer or write for detailed information on how the MARMACH LOADER can save you time and money.

Marion Machine Company  
Marion, North Carolina



Old road went through narrow underpass (left center), then turned sharply up hill, past farmhouse. New underpass will accommodate 4 lanes, and highway will skirt river.

## Taking a Kink Out of the Lincoln Highway



Tons of rock and limestone were moved to make way for new underpass, built adjacent to old highway.



Double-barrelled underpass starts to take shape. Bethlehem structural steel, in spans of 118 ft and 54 ft, was erected without interrupting railroad traffic.



At another location on job, Bethlehem reinforcing bars are placed atop 34-ft-span reinforced-concrete bridge.



Dale W. Detwiler (left), partner in New Enterprise Stone and Lime Co., points out job detail to R. S. Over, construction superintendent.

As part of its road-modernization program, the Pennsylvania Department of Highways has relocated the Lincoln Highway (US 30), in the vicinity of Everett, Pa., thus eliminating a sharp curve and narrow underpass. Construction of the new 2- and 4-lane, 2-mile stretch of road, handled by New Enterprise Stone and Lime Co., New Enterprise, Pa., included building a long revetment, a reinforced concrete bridge, and a railroad underpass. Bridge reinforcing, structural steel, bar mats and road joints were supplied by Bethlehem.

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## STEEL FOR HIGHWAYS

Road Joints • Reinforcing Bars • Bar Mats  
Guard Rail • Wire Rope and Strand • Spikes  
Timber Bridge Hardware • Structural Shapes  
Guard Rail Posts • Hollow Drill Steel  
Bolts and Nuts • Tie-Rods • Fabricated Steel





## Relocating Old Road Gives Safe Alignment

(Continued from preceding page)

inches and dropped to 2¼ inches.

Holes were drilled on 5-foot centers both ways and were charged either with Atlas or du Pont dynamite, mostly 40 per cent strength, although some 60 per cent was used at the bottom of the holes, depending on the nature of the rock. Also, from 3 to 4 caps were used in some holes to get a better break. The maximum number of holes shot was 225, using three circuits with up to 75 holes on a circuit. The average shot was around 200 holes. Little secondary blasting was required as the rock broke up into small enough chunks to be readily handled by the shovel. The yield averaged 1 cubic yard of rock to the pound of dynamite.

A Northwest 80-D 2½-yard shovel loaded the rock into a fleet of five end-dump Euclids. The capacity of these units was increased from 9.7 to 11.7 cubic yards when the contractor installed sideboards to get bigger loads. Working a 9-hour shift this rock-excavating equipment accounted for 1,000 to 1,500 yards of material each day it was in operation. The hauls averaged 1,500 feet.

The rock was placed at the bottom of the fills and built up in 5-foot lifts. Two Caterpillar D8 tractor-dozers worked on the dump, leveling off the rock after the Euclids unloaded. The rock work was pushed first, since the specifications called for an 8-inch cushion of dirt as the top layer of all cuts and fills. Consequently the rock had to be pretty much in place before the dirt work could be completed.

### Earth-Moving

Most of the dirt was moved by five LeTourneau Carryalls—three Model W 20-yard units, together with a J and YR model, each carrying 12 yards. All were pulled by D8 tractors, and another D8 pusher gave the scrapers the necessary shove in order for them to pick up the big load. Dirt-moving with the scrapers did not get under way until the middle of March, 1947, and then for three months little progress was made because of the extreme rainfall during the spring and early summer. When the weather did permit, this fleet of tractor-scraper moved an average of 3,000 cubic yards in a 9-hour day with the



C. & E. M. Photos  
The John F. Bloomer grading contract had a solid-rock excavation item of 102,478 cubic yards. Worthington wagon drills (above) drilled blast holes in rock cuts. The Northwest 80-D 2½-yard shovel, at right, loaded end-dump Euclids with the blasted rock.

hauls averaging 800 feet. Occasionally when the shovel and Euclids could not be spared from the rock work, the scrapers hauled dirt as much as 1,500 feet and better.

When loading, the scrapers took a cut only 3 to 4 inches deep over a long distance, rather than trying to dig too deep over a short run. This speeded up the loading operation and required the minimum of a push by the tractor in the rear. In dumping, the dirt was spread in 9-inch layers and then compacted to 95 per cent of Proctor density. This was achieved by rolling first with a LeTourneau sheepsfoot roller pulled by a D7 tractor, and then with a Buffalo-Springfield 10-ton 3-wheel roller.

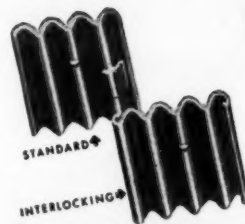
At times when the dirt was dumped on the fills in rather solid chunks, especially when the shovel and trucks were working, a Rome disk pulled by a D7 tractor worked over the surface. This broke up the material and made its compaction much easier. Another useful piece of equipment was a LeTourneau Rooter which was employed to good effect in the shale cuts, loosening up the material in front of the scrapers.

Good compaction results were obtained without adding water, as the red-clay earth retained the moisture with which it had been saturated during the first half of the year. Two

(Concluded on next page)



## NOW Rolled from Alloy or Mild Steel



Roller from a new steel alloy, Caine Corr-Plate is now 25% stronger and has nearly 100% greater corrosion resistance. This alloy makes available equal strength and nearly double the life in a 25% lighter piling. Approved by Highway Departments and U. S. Engineers.

## Caine CORR-PLATE Steel Piling

Caine Corr-Plate Steel Piling has been used the world over for Foundations, Dams, Retaining Walls, Docks, Locks, Bulkheads, Sewers, Disposal Plants and hundreds of other jobs—It's stronger, lighter, nestable, easy to drive and water tight; can be re-used again and again. Doubled life and 25% greater strength make Caine Corr-Plate Steel Piling the bargain buy in piling!

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NOW, MORE THAN EVER BEFORE . . .  
STRONGEST PER POUND WEIGHT

CAINE STEEL COMPANY  
STEEL PILING DIVISION, 1820 N. Central Avenue, Chicago 39, Ill.

## LACLEDE STEEL REINFORCEMENT speeds highway construction



Pre-Aligned Shop-fabricated DOWEL SPACERS

STEEL CENTER JOINT

Easy-To-Handle WIRE MESH

Laclede shop-fabricated dowel spacers units are position-welded and supports are preformed for automatic alignment and ease of assembly on the job without wire-tieing.



For economy and speed in construction—use LACLEDE STEEL Reinforcing Bars . . . Wire Mesh . . . Steel Center Joint . . . Recess Joint . . . Dowels and Tie Bars . . . Welded Dowel Spacers . . . Expansion Joints . . . Contraction Joints . . . Concrete Pipe Reinforcement . . . Pavement Accessories.

**LACLEDE STEEL COMPANY**  
St. Louis, Mo.

**Buying Used Equipment?**  
**Watch the "Trading Post"**  
**See Pages 110, 111**



Can be mounted on any short wheel-base truck having at least 8 ft. in back of cab. You can purchase unit separately and mount on your own chassis . . . The Netco Unit can be removed from truck in 30 minutes, permitting use of truck for other purposes. The Netco Bucket closes pneumatically assuring positive and maxi-

mum digging efficiency . . . The Bucket has full 1½ cu. ft. capacity with no chains or linkage to obstruct operation. The Netco Catch Basin Cleaner is faster, safer and more economical to operate than any other method used to remove debris from catch basins. Send for illustrated folder.

**NETCO DIVISION. CLARK-WILCOX COMPANY**

118 Western Avenue, Boston 34, Mass.





C. &amp; E. M. Photos

Caterpillar No. 12 motor graders shaped the roadbed to the required lines. When the job was originally worked up, the earth-work quantities balanced out in all but a 2,000-foot section where the necessary borrow was paid for as over-haul. Later the grades were changed slightly so that this section also balanced, and the contractor did not have to resort to borrow pits beyond the right-of-way.

#### Equipment Maintenance

The equipment was carefully looked after and always kept in good operating condition. One mechanic was assigned to the shovel and Euclids, and another to the tractors and scrapers. At noon a grease monkey came on and began lubricating the equipment, continuing into early evening until each machine had been greased. An Onan 1½-kw light plant furnished the necessary light. Lubricating was done with a Graco Convoy Luber mounted on a light truck; the unit had 5 hose wound on reels—2 for chassis lubricant, and 1 each for air, gear lubricant, and hypoid lubricant. DX fuel and motor oils were used in servicing the equipment.

Repairs were made either in a small shop on the job, or else in the field. One truck was equipped for this purpose with a winch and boom, and also carried along a 300-amp electric welder.

As the grading operations neared completion, the various crossings where county roads intersected the new state highway were dressed with a 6-inch layer of crushed stone. This was done so that cross traffic would not be held up by soft going in bad weather before the concrete pavement was laid. The stone, graded from 1½ inches down to dust, was supplied by the Mid-West Rock

Products Corp. of Spencer, Ind., 18 miles west of Bloomington. It was delivered to the job in trucks which dumped it at the various locations where the stone was called for. Graders spread it out and the 3-wheel roller compacted it to a smooth surface.

#### Quantities and Personnel

The major items included in the contract on this north section follow:

Excavation, common	290,092 cu. yds.
Excavation, special borrow	62,139 cu. yds.
Excavation, solid-rock	102,478 cu. yds.
Concrete for structures	937 cu. yds.
Reinforcing steel	299,442 lbs.
Compacted aggregate surface	5,361 tons
Concrete pipe, 15 to 36-inch	1,246 lin. ft.

For the John F. Bloomer Co. Bernard Loughlin was General Superintendent, with H. P. Ebert, Grading Superintendent. The contractor employed an average force of 40 men. For the State Highway Commission of Indiana, J. S. Taylor was Project Engineer.

At the south end of this section a bridge was built under a separate contract, to take care of the overflow from Bean Blossom Creek. R. L. Schutt of Indianapolis was awarded the contract on a low bid of \$40,402.38. The reinforced-concrete girder structure has four spans of 36 feet each.

#### Southern Section

The 2.8-mile section at the south end of the project under contract to Ralph Rogers Co. had considerably less rock, but lacked dirt, especially near the north end. Material for the fills across this lowland area came from a borrow pit only 300 feet off the right-of-way but a mile from where it was needed. On this long haul four Tournapulls of 15-yard capacity were used chiefly, with a D8 acting as a pusher in loading and two other D8 tractor-dozers

At the left in the first picture a Euclid end-dumps a load of rock on the fill during realignment and grading of Indiana State Route 37. Side boards increased the capacity of these units from 9.7 to 11.7 cubic yards. In the second picture, two Caterpillar tractor-dozers level off the rock after it is dumped.

spreading the material on the fills.

In the rock work the holes were made with a couple of Ingersoll-Rand wagon drills powered by an I-R and a Gardner-Denver 315-cfm air compressor. A Lima 2-yard shovel excavated the material into the five end-dump Euclids which were on the job. The Euclids were also used on some of the longer dirt hauls. On the shorter dirt hauls up to 1,000 feet, the contractor employed four LeTourneau 16-yard Carryalls pulled by D8's. Compaction was done with disk harrows, sheepfoot and smooth-wheel rollers.

The major items on this contract included the following:

Excavation, common	89,238 cu. yds.
Excavation, special borrow	150,076 cu. yds.
Excavation, solid-rock	42,425 cu. yds.
Concrete for structures	1,213 cu. yds.
Reinforcing steel	324,608 lbs.
Compacted aggregate surface	147 tons
Concrete pipe, 15 to 30-inch	523 lin. ft.

K. W. Wysong was Superintendent

for the contractor who employed a force averaging 15 men. E. K. Newton was Project Engineer for the Highway Commission.

Carl E. Vogelgesang is Chief Engineer for the Indiana State Highway Commission. J. T. Hallett is Engineer of Roads, and F. L. Ashbaucher is Engineer of Road Construction.

#### Preview of Road Show

The June issue of CONTRACTORS AND ENGINEERS MONTHLY will carry a special "preview" of the exhibits to be found at the Road Show. This article will list the manufacturers who will be there, the numbers of their booths, and the principal road-building equipment or materials to be shown.

This guide will be helpful in planning an itinerary for covering the more than 300 exhibits.

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SELF-POWERED  
LAWN MOWER

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An industrial plant or any enterprise surrounded by an acre or more of lawn merits consideration for beauty. The Scimitar was expressly constructed for fast, economical and trouble free operation. The wheels also are self-powered. Your maintenance crews can cut one acre per hour.

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How much money will this instrument save YOU? Preliminary surveys in 1/10th the time with accuracy better than 1 part in 1000.

Type SA-1: Range 4360' (-760' to + 3,600') in intervals of 2'  
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Type SA-3: Range 15000' (-500' to + 14,500') in intervals of 10'

All models priced \$200 complete with case, hand & shoulder straps, magnifier and thermometer. IMMEDIATE DELIVERY—see your dealer or write direct for descriptive folder.

**AMERICAN PAULIN SYSTEM**

Manufacturers of Precision Instruments

1847 SOUTH FLOWER STREET, LOS ANGELES 15, CALIFORNIA

*Altimeters*





Scotch Wetordry tape, applied by this Minnesota Mining & Mfg. Co. machine, splices concrete-curing mats securely.

### Curing Mats Bound With Cellulose Tape

A machine designed to tape concrete-curing mats together is announced by the Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul 6, Minn. According to the manufacturer, this new applicator for Scotch floor tape will pay out the tape as fast as a man can walk.

The tape sticks upon contact, and is pressed into place by the 33-pound weight of the machine to provide a tight seal and bind the mats securely. According to the manufacturer, the Scotch Wetordry tape is impervious to the action of rain, wind, and sunlight. When the curing process is completed, the tape is stripped from the mats without any harm to them.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 38.

### Conveyor-Belt Fasteners

A line of fasteners for conveyor, transmission, and other belts is made by the Flexible Steel Lacing Co., 4656 Lexington St., Chicago, Ill. A catalog describing the complete line has been prepared and is now being distributed by the company. It consists of a series of loose-leaf sheets inserted in a heavy-paper cover.

The items it lists include Alligator steel lacing for machinery belts; Flexco HD fasteners for joining conveyor and elevator belting in any width; hinged Flexco belt fastener designed to make up into a separable joint; Alligator belt cutters; Alligator V-belt fasteners for cross-woven fabric belts; and miscellaneous equipment for use in applying the fasteners.

Each item is thoroughly described and illustrated. Detailed instructions tell how the fasteners are applied, and text describes their features. Also listed are the sizes in which they are made, and the sizes of belt with which they can be used.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 73.

### Wanted to Manufacture

New products suitable for use by road builders and general contractors.

Old established manufacturers with a national and international distributing organization has recently completed a new up-to-date crane type building with modern machine shop, welding department and facilities for general fabrication of structural steel.

Plant located in midwest 100 miles from Chicago on main lines of two transcontinental railroads.

BOX 279

Contractors & Engineers Monthly  
470 Fourth Avenue, New York 16, N.Y.

### Dynamometer Tests Drawbar Horsepower

A dynamometer for measuring horsepower requirements for heavy-duty earth-moving equipment has been developed by The Firestone Tire & Rubber Co., Akron, Ohio. It is designed to measure drawbar pulls of up to 100,000 pounds. Firestone points out that with accurate job rating, equipment can be assigned to jobs on the basis of what it can actually do, instead of on the basis of past performance; that time and money need no longer be wasted in replacing under-powered equipment on jobs.

The new Firestone dynamometer is designed to chart and record drawbar pull and drawbar horsepower under



The new Firestone dynamometer clocks the drawbar pull of a butane-burning Model A Tournadozer, followed by three Model C Tournadozers, during tests at Longview, Texas.

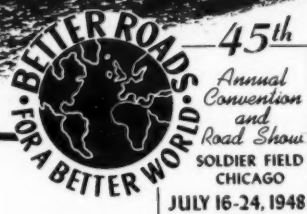
all conditions. It can also be used to test the tractive ability of heavy-duty tires.

The test unit is constructed on a 4 x 2 truck-tractor chassis. Component parts include a water tank to allow variable weights, diaphragm-type

drawbar-pull measurement devices at front and rear, and a fifth wheel equipped with time and distance instrumentation.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 14.

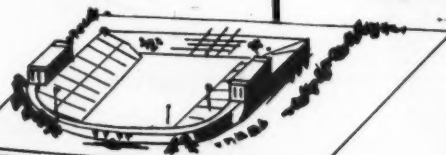
# Why YOU should PLAN TO COME TO THE ROAD SHOW



**Over 5000  
pieces of  
equipment!**

Imagine over 30 acres—a small farm—filled with construction machinery... some of it operating... some of it never before shown. Here is a practical picture backed with new information, new data, that shows the way to better performance and increased efficiency.

**IT IS THE MOST  
DRAMATIC SPECTACLE IN  
CONSTRUCTION HISTORY  
— A MUST FOR EVERY  
CONSTRUCTION MAN.**



**45th**

**ANNUAL CONVENTION AND  
INTERNATIONAL ROAD SHOW  
SOLDIER FIELD • JULY 16-24, 1948**

**AMERICAN ROAD BUILDERS ASSOCIATION**  
International Building, Washington 4, D. C., U. S. A.

THERE is a \$1,500,000,000 road program for 1948—the greatest in construction history. This stupendous figure represents the largest appropriation ever made for construction of highways and airports. Seeing this machinery exhibited at the Road Show you have the opportunity to get ready for your part in this great construction program of all time. If for no other reason than this, you should attend the Road Show.

State, county and municipal governments will require approximately \$240,000,000 for equipment for maintenance work in 1948. Another \$265,000,000 worth of equipment will be needed for new construction. It is conservatively estimated that an additional \$150,000,000 for new equipment will be required to bring construction equipment inventories up to normal.

### TECHNICAL SESSIONS YOU CAN'T AFFORD TO MISS

There will be discussions on highway engineering, grade separations, airport construction, concrete and bituminous highway construction, soil compaction, highway terminals, the contract system and day labor, tar soil stabilization, cement soil stabilization, highway safety, control of city pavements, snow removal, highway maintenance, elevated and depressed highways, express highways, radio communications in highway control, weights and sizes of vehicles, bridge construction practice, property assessment for highways, public relations, legal affairs, highway finance, gross weights on highways and on many other topics that are so much a part of your day's work. Bring yourself up-to-date on the latest phases of the important subjects.

### EVERY DAY AN OUTSTANDING DAY!

Friday, July 16	Distributors Day
Saturday, July 17	International Day
Sunday, July 18	Educators and ARBA Student Chapters Day
Monday, July 19	Associated General Contractors Day
Tuesday, July 20	ARBA Contractors Day
Wednesday, July 21	County Day
Thursday, July 22	Municipal and Airport Day
Friday, July 23	All States Day
Saturday, July 24	Chicago Day



C. &amp; E. M. Photos

## Shoulders Stabilized With Asphalt and Tar

(Continued from page 1)

with each lift rolled as it was placed. Rolling was done by two loaded bottom-dump Euclids moving one behind the other in tandem. Each loaded Euclid weighed about 30 tons. After rolling, the surface of the shoulder was bladed and shaped by an Austin-Western motor grader.

According to the terms of the contract, these gravel shoulders were to be given a single shot of bitumen for a width of 9 feet next to the pavement, and then covered with a light blanket of sand. This would meet the requirements of surface-treated shoulders.

### Mixed-in-Place Method

However, the State Highway Department decided to try an experiment with these newly built shoulders. For the surface-treatment method of stabilization it planned to substitute a mixed-in-place bitumen-stabilization type of shoulder construction. On the shoulder bordering the south lane the gravel was mixed with asphalt, while the north shoulder was mixed with tar.

Some bitumen of course was already included in the contract for the shoulder work, and rolling was considered a part of the surface-treatment item. Where more bitumen was required for the mixed-in-place method, the State paid for the additional material. It also paid for additional rolling at the regular equipment rental price for machine and operator. To mix the bitumen and gravel in place, a Seaman Pulvi-Mixer powered by a Waukesha 60-hp engine and pulled by a Minneapolis-Moline tractor was rented from Deephouse Equipment Co., Berlin, Conn.

### Different Grades of Asphalt

First, the tractor-drawn Pulvi-Mixer, which is 5 feet wide, made two passes over the south shoulder to loosen up the top 3 inches of the 9-foot shoulder width to be stabilized. This was done to fluff up the gravel, aerate the material, and thus remove any ground water that might have accumulated. Then the asphalt was applied. Ford Bros. of New Haven, Conn., furnished and applied Texaco asphalt in four different grades on different portions of the road in order that the varying results, if any, might later be compared.

The asphalt was hauled in either supply tank trucks or distributor from New Haven or Hartford. If in tank trucks, it was transferred to the distributor on the job site. The grades used were MC-2, MC-3, RC-2, and RC-4. The asphalt was heated by the burner on the distributor. It was applied to the shoulder at an average temperature of 200 degrees F through a 9-foot spray bar sticking out to the side as the distributor truck rolled along on the pavement. Most of the asphalt was applied with an Etnyre 3,150-gallon distributor mounted on an Autocar.

### Procedure

For the first application the asphalt

was shot at the rate of  $\frac{3}{4}$  gallon to the square yard. Following right behind the distributor came the Pulvi-Mixer, mixing the bitumen and gravel to its effective working depth of  $4\frac{1}{4}$  inches. It made two passes over the shoulder to cover the 9-foot width. Then the dis-

tributor made a second application of asphalt at the rate of 1.0 gallon to the square yard, and the Pulvi-Mixer followed. (Concluded on next page)

## are you being taken for a buggy ride?

Is the high cost of materials and labor clouding your profit picture . . . endangering your customer relations?

**To cost-conscious** contractors and engineers, Rex Pumpcrete . . . the pump that pumps concrete through a pipe line . . . provides a proved way to substantially reduce costs!

**For example!** Think of the costs involved in bugging concrete! Figure the savings to be gained when you can eliminate the buggy run and deliver concrete through a pipe line right to the point of replacement.

**Then!** Figure how much you could cut your bids if you could be assured the fastest, most advantageous form and steel setting sequence . . . if you could achieve a closer coordination between the trades (carpenters, steel setters, concrete crews) and reduce interference with these interlocking activities.

**Because Pumpcrete** makes these advantages possible through steady pumping instead of the usual occasional pour, you can cut days off your schedule . . . and that means money in your pocket!

**Add** to these cost-cutting advantages, the fact that Pumpcrete transports concrete through a pipe line on one or more levels . . . elevates or lowers and distributes concrete in ONE operation. Thus, you can eliminate the expense of road building and maintenance . . . trestling and scaffolding . . . towers and many other items of preparatory work that add materially to construction costs.

**If you want** to avoid being taken for a "buggy ride," talk to your Rex Distributor before you bid. He can show you how you can cut costs . . . improve concrete quality . . . make more money with "concrete by pipe line." If you prefer, write direct for free copies of informative Bulletins on Pumpcrete economy. Address Chain Belt Company, 1666 West Bruce Street, Milwaukee 4, Wis.

REMEMBER, Pumpcrete can now be rented at your Rex Distributor's so you can prove the economy of pipe line placement for yourself at low cost!



CONSTRUCTION MACHINERY





"... and now—one of my own compositions!"

## Shoulders Stabilized With Asphalt and Tar

(Continued from preceding page)

lowed in its wake as before. This time, however, it made four complete passes over the shoulder, or a total of eight passes for the second mixing to cover the 9-foot width.

The asphalt-coated gravel shoulder was shaped by the motor grader, then rolled by the heavily loaded bottom-dump Euclid. The big unit rolled up and down the shoulder, compacting the material with its broad pneumatic tires until the 4¼ inches of loose mixed material had been compacted to 3 inches. The gravel had been left a little high in the beginning to compensate for the rolling which left the inside of the shoulder level with the pavement. Final smoothness and finish was secured with a 10-ton 3-wheel Buffalo-Springfield roller.

After the asphalt work on the south shoulder was completed, the north shoulder was similarly treated with Koppers tar, and mixed-in-place in the same manner. The grades of tar used were RT-3, RT-4, RT-5 and RT-6, at the same rate of application as the asphalt. The mixed-in-place shoulder stabilization was started the latter part of November and was completed early in December.

### Personnel

Sam Velleca was Superintendent for D. V. Frione & Co., the contractor, while Stanley Amidon was Chief Inspector on the project for the Connecticut State Highway Department. The Department is headed by G. A. Hill, State Highway Commissioner, with R. E. Jorgensen, Deputy Commissioner and Chief Engineer.

### Bits for Rotary Drill

A rotary-drill bit for drilling overburden that contains hard shale, hard slate, limestone, and some types of sandrock is being produced by Kennametal Inc., Latrobe, Pa. It is made in a 9-inch-diameter size.

The bit has a solid-head construction, three drilling prongs, and cutting edge faces of Kennametal inserts. The Kennametal points of the bit are designed to cut three different paths, and form a cutting or breaking pattern of three concentric rings in the bottom of the hole. The prongs are set at an angle of 120 degrees, and are twisted 15 degrees from the vertical to accelerate the movement of cuttings away from the point.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 36.

### Arc-Welding Electrodes

A catalog which describes Murex arc-welding electrodes is being distributed by the Metal & Thermit Corp., 120 Broadway, New York 5, N. Y. It gives complete technical information on these electrodes, including physical and chemical characteristics.

The bulletin describes electrodes for welding low-alloy and special steels, mild steels, and stainless steels; electrodes for welding aluminum or bronze, and electrodes for automatic welding, hard-surfacing, and building up. It groups them according to these uses and lists their applications, properties, and color, as well as their names or model numbers. Also included on the last page of the catalog is a list of Murex distributors in the United States.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 87.

### District Office for SKF

Its Charlotte, N. C., branch has been named district headquarters by SKF Industries, Inc., Philadelphia, Pa., manufacturer of ball and roller bearings. It will head a territory embracing North and South Carolina, 74 counties in southern Virginia, 30 counties in eastern Tennessee, and 2 counties in northern Georgia.

### Forms and Accessories

A broadside covering its complete line of concrete forms and related accessories can be secured from the Universal Form Clamp Co., 1238 N. Kostner Ave., Chicago 51, Ill. The folder tells how the Universal forms are designed to save the user money, and lists briefly the standard stock items.

It illustrates the Uni-Form system of

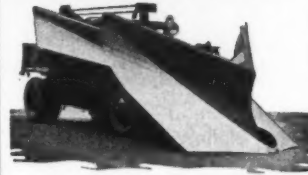
wall-form construction; the accessories for reinforced-concrete construction; and the various types of anchors, forms and form ties, and other specialty items. All of this equipment is available for rental with a purchase option. The folder shows a picture of each of these units, as well as on-the-job photos.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 68.

## UNINTERRUPTED WINTER TRAVEL

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### DAVENPORT - FRINK SNO-PLOWS



ALL TYPES AND SIZES

No matter what the snow or ice conditions, you obtain FASTER • SAFER • CLEANER snow removal with the lighter, yet stronger DAVENPORT-FRINK SNO-PLOWS. Available in "V" and Straight Blade types for all sizes of trucks, tractors, road patrols and locomotives. Be ready. Buy early. Write us for complete information.

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Made in Eastern U.S.A. by CARL H. FRINK

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DAVENPORT, IOWA  
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# Barber-Greene

*Sensational*

NEW CAR UNLOADING TEAM!



unloads car of rock or crushed stone  
in **45** minutes

### B-G HOPPER CAR UNLOADER

Here's a rugged all-material unloader that's completely new in design. The 358 cuts hopper car unloading time as much as 90%—unloads most any bulk product from fine sandy material to large-sized rock aggregates at capacities up to 3 tons per minute—empties a 60-ton car in as little as 45 minutes without jam-ups or delays. There's positive material flow at all times. Easily "spotted" in track pit or above rails—really portable—can be towed at normal traffic speeds.

### B-G PORTABLE CONVEYOR

The newly designed B-G Model 363 Portable Conveyor is an extremely flexible machine that will prove to be profitable to yards, industrial plants, contractors, etc. Speeds up stockpiling or transfer of material from car or stock pile to trucks. Entirely new in design, the 363 features V belt drives, pneumatic tires, shock absorbers, towing hitch, and a host of new improvements. Send for new attractive literature on these two great B-G machines.



BARBER • GREENE COMPANY, AURORA, ILLINOIS

*Constant flow Equipment*



LOADERS



PERMANENT CONVEYORS



PORTABLE CONVEYORS



COAL MACHINES



BITUMINOUS PLANTS



FINISHERS



DITCHERS

# Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney

## A Street Contractor's

### Right to Removed Soil

**THE PROBLEM:** A municipal contract for sidewalk grading, etc., on a new street provided that materials not used on the job should belong to the contractor and be removed by him. As it developed, the City prevented the contractor from performing the contract. In measuring the contractor's damages, was it proper to include the profit he would have derived from selling surplus earth?

**THE ANSWER:** Yes, said the New York Court of Appeals, reversing a decision of lower courts to the contrary. (Long Island Contracting & Supply Co. v. City of New York, 204 N. Y. 73, 97 N. E. 483.)

The contract called for payment for excavation at a specified yardage rate. As the dirt exceeded the fill, there was bound to be surplus earth even after the low places had been filled. And the work of excavation, for which 20 cents per cubic yard was to be paid, included both making the fill and removing the surplus earth. After the plaintiff had been notified to commence work and had incurred expenses in preparing to perform the contract, the City changed the plan of construction. As a result, performance by the plaintiff became impossible, and it was so notified by the proper authority.

The plaintiff sought to recover the amount he had spent in preparations and the difference between the contract price and the cost of performance. He included as part of the former the market value of 20,666 cubic yards of topsoil which, by the terms of the contract, he claimed, would have belonged to him if performance had been permitted. The trial court refused to allow any recovery on account of the topsoil, or to permit evidence to be given as to the market value thereof.

In ordering a new trial, the Court of Appeals said:

"The requirement that the contractor should remove the surplus earth, with no reservation of title by the City, no stipulation that it should be removed to a specified place, and no direction as to what should be done with it, except simply to remove it from the line of the work, implies that the contractor could do what he wished with it. He was bound to get rid of it and this was an abandonment or transfer by the City of its right thereto. It was part of his compensation for doing the work of excavation. The City had acquired the land on which the street was to be constructed, and it is not claimed that the surplus earth belonged to the former owner of the fee. The duty to excavate and remove it, without any reservation or condition, made it the property of the contractor as soon at least as it was loaded upon carts or other vehicles for the purpose of removal. In this respect the contract is not unlike one to tear down a house and remove the materials. If nothing is said as to what is to be done with them after they are removed, by necessary implication they belong to the contractor."

However, this should not be overlooked: the Court of Appeals emphasized that the City had fee title to the site and that, therefore, no rights of the owner of abutting land were involved. This seems to have been stressed in recognition of the general rule of law that where a city, county, or other public agency holds a mere easement over land for use as a street or highway, an abutter "has title to any superfluous earth, gravel, or rock, not necessary or useful to the construction or repair of the highway" (39 Corpus Juris Secundum, 1075, sec. 138a).

## Surety Was Not Released

### By a Change in Contract

**THE PROBLEM:** Was a subcontractor's surety discharged from liability because the subcontractor waived a right to hold the contractor liable should the latter fail to furnish a place to work? No damages resulted from failing to furnish a place to work.

**THE ANSWER:** No, said the United States District Court, Northern District of West Virginia. (Haddad v. Western Contracting Corp., 71 Fed. Supp. 212.)

The court invoked the general rule of law that a paid surety is not released from liability through a change in a construction contract, covered by the suretyship, to which he has not assented—unless the change prejudices him.

## Street-Accident Liability

**THE PROBLEM:** Sewer contractors who were required to remove surplus excavated material from a street gave it to a dairy company, and loaded it into the company's truck in the street. While the contractors' employee was

directing the truck driver into position for loading, the truck was backed against children who were in plain sight. Were the contractors liable?

**THE ANSWER:** The contractors could not be held liable upon a theory that the driver of the truck was their employee for the time being. But the contractors could be held liable on a theory that their employee was concurrently negligent with the truck driver. So a decision of a lower court in favor of the contractors was set aside, and a new trial was ordered to determine whether they were liable in the light of the law as thus

stated by the Rhode Island Supreme Court (Bucci v. Butler, 53 Atl. 2d 705):

The contractors were bound not to create any situation dangerous to persons in the street, especially children. If the contractors, united with the dairy company for common benefit, were guilty of negligence that directly caused injury to plaintiff, one of the children, the contractors were liable.

## To Constitute a Contract

### Acceptance Must Be Clear

**THE PROBLEM:** Defendant, a general contractor, invited plaintiff, a subcontractor, to bid on certain work; defendant was to use plaintiff's bid as a basis for bidding on a Navy contract. Plaintiff, in submitting a bid, telegraphed defendant: "If our estimate used wire us collect prior to June 6 or else same is withdrawn." Defendant replied: "We used your bid for wiring on barracks and dispensary." Did the reply constitute an acceptance of plaintiff's bid?

**THE ANSWER:** No, ruled the United States Circuit Court of Appeals by a vote of two to one, affirming a decision of the United States District Court, Southern District of Mississippi (Williams v. Favret, 161 Fed. 2d, 822).

Declared the majority opinion: "That an offer does not ripen into a contract until acceptance, is hornbook [elementary] law. Plaintiff . . . seeks to avoid its effect by importing into the exchange of telegrams a conditional acceptance. Unfortunately for plaintiff, it is just as much hornbook law that where a contract is claimed as resulting from an offer and an acceptance, the offer must be clear, definite, and complete, and the acceptance must be in the terms of the offer. . . . Defendant's telegram . . . sent in direct response to plaintiff's . . . contains nothing from which an acceptance of the offer, conditional or otherwise, can be implied."

Accordingly, the court decided that defendant did not render himself liable to (Concluded on next page)

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## Avoid Legal Pitfalls

(Continued from preceding page)

plaintiff in damages on refusing to award a subcontract to plaintiff and on awarding the subcontract to a third person at a lower price than plaintiff bid.

### Is Drainage Contractor Liable for an Overflow?

**THE PROBLEM:** A drainage district was legally established and a contract was let to construct a canal. Was the contractor liable for overflow of lands, in the absence of a showing that he had departed from plans and specifications?

**THE ANSWER:** No. (Roland v. Jumper Creek Drainage District, 4 Fed. 2d 719, decided by the United States District Court, Southern District of Florida.)

The plaintiff's suit for damages was based upon a theory that the contractor was liable because he negligently opened the canal above, allowing waters from an upper basin to overflow the lower one, without first providing for drainage of the overflow. The court noted that it could not say whether the contractor violated his contract in that respect because plaintiff did not show that there was any specification as to where work was to commence. Nor was there anything to show that "the contract provided for the construction of drains through the lower basin to carry off the waters before admitting the waters from the upper basin". The court followed the reasoning of the Iowa Supreme Court in a case where a drainage contractor was sued for overflow resulting from construction of canals and ditches in conformity to plans and specifications (Fitzgibbon v. Western Dredging Co., 141 Iowa, 328, 117 N. W. 878).

"The ditch being constructed by the State acting through its local agencies in the exercise of its power of eminent domain, the contractor and laborers who do the work of actual excavation are not liable for damages which naturally result to . . . lands from carrying the scheme or plan of drainage into execution. In other words, if the contractor or laborer makes the ditch substantially in accordance with the plan furnished him, taking reasonable care to avoid doing or causing unnecessary injury to adjacent lands, he is not charged with responsibility for injurious effects which naturally follow the authorized improvement. In the absence of any provision to the contrary in the contract, it will also be conceded that the contractor may employ means and methods of excavation which are usual and approved generally among persons performing that kind of service. As is well known, drainage ditches of any considerable portions in this state are quite generally constructed by the use of steam dredges mounted on a boat or raft working from the highest elevation on the route down grade in the direction of the outlet, the boat or raft floating upon the water which accumulates in the ditch as the work advances. Naturally, the further the work progresses,

the larger the body of water which may be expected to accumulate behind the dredge, and where many ponds or swampy places are tapped, it is inevitable that some of the water so collected will fill or overflow the banks of the ditch before the pressure is relieved by the completion of the excavation to some outlet. For damages caused by such overflow, the contractor under the rule already stated is not to be held liable without it being shown that such overflow was caused or augmented by some negligent act or omission on his part. There is no contract relation, express or implied, between him and the landowner, and the measure of his duty in the premises is found in the general rule which binds each person to so use and enjoy his own rights and privileges as to avoid injury to his neighbor."

### Written Subcontract Does Not Cover Rock Removal

**THE PROBLEM:** Subcontractors claimed, and the general contractor denied, that he requested them to remove certain excavated rock from the work site, though no price for the work had been agreed upon. They claimed that \$3 per yard was a reasonable charge. Did the subcontractors have a right to show that the Federal government paid the general contractor \$9.50 per yard for the removal?

**THE ANSWER:** Yes. (Quinn v. Wilkerson, 195 S. W. 2d 399, decided by the Texas Court of Civil Appeals, Fort Worth.) Said the court:

"It . . . was material, in that it had some bearing on the question of whether or not the parties contemplated that" the general contractor "should pay the" subcontractor "for removing the rock that was not covered by the written subcontract. In determining whether such was the case, it was proper to take into consideration the fact that the general contractor was paid by the Federal government."

The court added that the proof tended to show that the general contractor received benefit from work done at his special instance and request, and that "in good conscience he should pay . . . for the reasonable value" of the work.

### When Surety Completes Job, What Rights Does It Have?

**THE PROBLEM:** A highway contractor did not complete the road base on a project within reasonable time. He therefore lost the right to require performance of a subcontract for surfacing. The contractor's surety took over the work as provided by its bond and took an assignment of the contractor's rights.

1. Could the surety hold the subcontractor liable for refusal to perform after the base was provided? 2. Was the subcontractor justified in treating the subcontract as terminated when surety took over the work?

**THE ANSWER:** 1. No, the surety could not hold the subcontractor liable, decided the

United States District Court, Eastern District of Kentucky. (National Surety Corp. v. Allen-Codell Co., 70 F. Supp. 189.) One who takes over a contract can have no stronger rights against third parties than his predecessor had.

2. Yes, the subcontractor was justified in treating the subcontract as terminated when the surety took over. After time for completion of the principal contract had expired,

and the contractor had provided no more than a small area of base (which the subcontractor promptly surfaced), work was suspended for four months; it was then abandoned by the contractor. The contractor's failure to pay sums due the subcontractor and his confessed inability to complete the work, afforded the subcontractor further justification for treating the subcontract as terminated.

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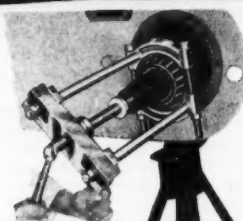
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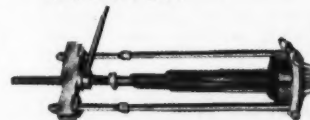
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## New Plant to Take Boston-Area Sewage

(Continued from page 2)

long peninsula jutting out from Quincy, Mass. The land arm separates Quincy Bay from Hingham Bay. The South Metropolitan trunk sewer runs out this causeway to the existing plant, a single red brick building at the end of the peninsula. At present the sewage is untreated, but the larger solids are removed and burned at this so-called screen house where the sewage passes through racks of the cage-elevator type. The existing trunk sewer has a capacity of 300 mgd. The raw sewage is discharged continuously through two 60-inch pipes to a point about 6,000 feet from the shore, just west of Peddocks Island. A third 60-inch pipe to a point 1,400 feet offshore and north of Nut Island is available at times of high flow.

The new plant is designed to serve a population of 700,000 right now, and 900,000 by 1955. It will remove floating solids and greases. It will also reduce the amount of suspended solids as much as is possible in sedimentation tanks, with a detention of about 1½ hours at the design rate, with the aid of a 20-minute pre-aeration of flocculation. During the recreational season, the effluent will be chlorinated to prevent bacterial pollution of harbor and shore waters. Subject to the approval of State and Federal authorities, the sludge will be digested, and the innocuous residue will be discharged through an outfall pipe about 4 miles long to deep tide-water. A small portion of this residue may be unwatered and recovered as low-grade fertilizing mulch. Gas from the digestion will be used to furnish power for plant needs, including the necessary low-lift pumping and the aeration.

### Many Contracts

Before construction could begin on the Nut Island plant, the island first was enlarged to accommodate the new structures. The lands under water east of the causeway were filled in, to provide a strip of land 450 feet wide, east and west, and 1,300 feet long, stretching north from the mainland at Houghs Neck to the old plant at the tip of the peninsula. This contract was performed by V. Barletta Co. of Roslindale, Mass., on a low bid of \$478,814.

Work started the latter part of 1945, continued through the winter, and finished up in the summer of 1946. Over 250,000 cubic yards of sand and gravel were hauled by trucks from borrow pits and end-dumped into the water. In places, 23 feet of fill was required.



C. & E. M. Photo

Looking along the influent side of the sedimentation tank at the Nut Island plant, we see forms being built—and farther on, the finished concrete wall.

The soft, muddy bottom was forced out ahead of the fill placement, and when the toe of the outer slope was reached, the muck was blasted away. The east bank is protected by a layer of riprap.

The second major contract on the project was then awarded to the same firm, V. Barletta Co., to construct the plant which contains the concrete sedimentation and aeration tanks, the conduits, and also the foundation for the main building which contains the power plant. The low bid price on this contract was \$1,179,763.

This contract does not include building the four reinforced-concrete sludge-digestion tanks, 110 feet in diameter x 30 feet deep. A \$394,758.50 contract was awarded for this work to Farina Bros., Inc., of Newton, Mass., in June, 1947.

Still another contract, for \$575,724, was awarded to the Bay State Dredging & Contracting Co. of East Boston, Mass., to furnish, fit, and lay 21,300 linear feet of 12-inch cast-iron sludge-disposal line. This pipe has been laid from Nut Island northwards under the bottom of Quincy Bay to Long Island. It then runs along the east shore of the island, past Fort Strong, to discharge into President Roads, the main ship channel out of Boston Harbor. The pipe line was 95 per cent complete in 1947, and was expected to be finished early this spring.

The section of submarine pipe line, 13,800 feet long, was laid in a trench dug out by a scoop bucket on a dredge. Victaulic couplings connect the ends of the submerged lengths of pipe, while mechanical joints are used for the re-

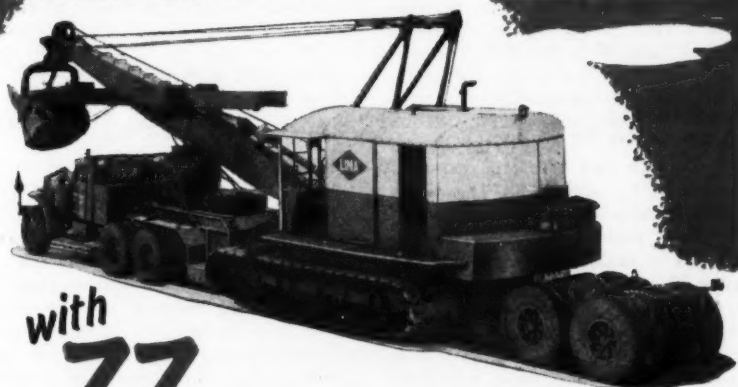
mainder of the pipe laid along the shore of Long Island. Clean-out chambers will be installed in the shore section of pipe this spring, and these may be worked on at low tides. The digested sludge will be pumped through this line from the sewage plant to the Atlantic, opposite Deer Island.

Other large contracts are mainly for equipment to be installed in the plant. The Worthington Pump & Machinery Corp. has a \$330,374 contract to furnish three engine-driven generators, four main pump units, and two blower units. The Jeffrey Mfg. Co., under a \$137,927 contract, will supply grit washers, also grit sludge and scum collectors for the sedimentation tanks. Six comminutors, flushing and water pumps, sludge pumps, and a diffuser-tube aeration system are being built for the plant by the Chicago Pump Co. which has contracts totaling \$104,115. Supernatant selectors, heat exchangers, two digestion-tank covers for the secondary tanks, and sludge pumps will be manu-

(Continued on next page)

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## New Plant to Take Boston-Area Sewage

(Continued from preceding page)

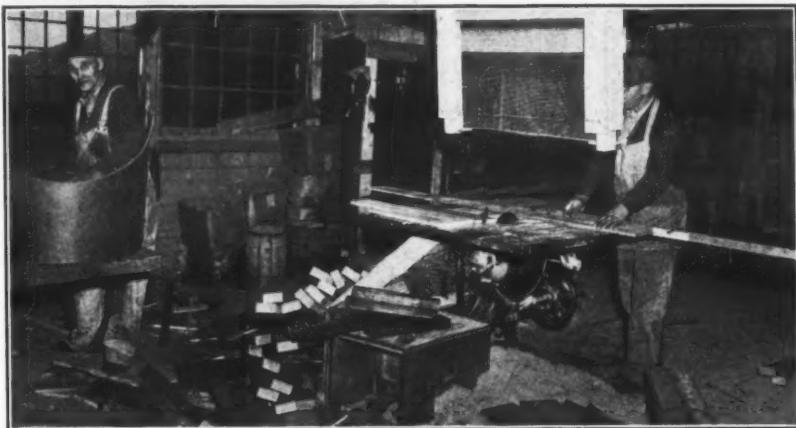
factured by the Pacific Flush Tank Co. under a \$106,371 contract. Wallace & Tiernan Co., Inc., has a \$48,927 contract for the chlorinating equipment. Various other minor contracts bring the total cost of contracts awarded to date on the Nut Island Sewage Treatment Plant project to \$3,595,464.

### Sewage Flow Course

The raw sewage reaches Nut Island through an old horseshoe-shaped sewer, 11 feet 3 inches wide x 12 feet 6 inches high. When the new plant is completed, the sewage will then be admitted to two medium-bar screen racks at the west end of the main building, which will be about 75 feet wide x 180 feet long with a power plant 100 x 65 feet. From there the sewage will go to six parallel grit channels with a connection to a grit washer. The washed grit will be stored for disposal later. At the other end of three of these six parallel grit channels will be six 36-inch comminutors, two to a channel; the remaining three grit channels will be followed by fine-bar screen racks. They will discharge the rakings from the high-flow channels directly to the comminutors in the other low-flow channels.

The material will then flow to a pump suction well where it will be pumped out by three mixed-flow low-lift pumps, and discharged through a Venturi meter into five aeration tanks, four parallel and one across the ends. The tanks will occupy an area 90 x 206 feet. The design rate-of-detention period is 20 minutes, but for a dry summer season with a flow of 70 mgd the period will be increased to 32 minutes. At the design rate, 0.13 cubic foot of air is provided per gallon of sewage.

From the aeration tanks an influent conduit will pass the material to six sedimentation tanks. The parallel tanks measure 70 x 186 feet. There are four bays, each 17 feet wide, to a tank. The tanks are in pairs 21 feet apart. Of concrete construction, they have 12-inch floor slabs, an 8-inch roof, and side walls from 12 to 18 inches thick. On one side the influent conduit is 11 x 8 feet at the north end, and decreases to 4 x 3 feet at the south end. A similar change also occurs in the effluent con-



C. & E. M. Photo

Forms, a major problem on the Barletta contract, were built in a carpenter shop erected at the site. Here a Fay & Egan tilting arbor saw cuts lumber to size.

duit at the other side of the tanks. This conduit increases from a 3 x 7½-foot opening at the south end, to a 10 x 10-foot aperture at the north end.

The changes in the sizes of the conduits will give a more uniform distribution to the six tanks, and help prevent excessive settlement of solids at the bottom of the conduits. Grease and scum can also be removed more easily from the top. The design rate calls for an 88-minute detention period in the sedimentation tanks. This period may be increased to 141 minutes in a dry summer when the recreation use of the harbor may be affected.

The effluent will be chlorinated and will discharge to the sea through the three existing outfalls where diffusers have been installed over the discharge of the two principal outfalls. So instead of raw sewage, as at present, only a clarified and diffused effluent will be discharged. The chlorinators will be used during the summer recreation season.

Raw sludge will be removed at the design rate of 213,000 gallons, 95 per cent moisture. Long narrow collectors will scrape off the sludge on the bottom, and the grease and scum on the top of the tanks at the same point—a unique design feature of the plant. Three raw-sludge and grease pumps will then pump what has been collected through force mains to four digestion tanks, each with a full working capacity of 2,300,000 gallons. Tanks 1 and 2, with fixed covers, are for primary digestion; tanks 3 and 4, with floating covers, are for secondary digestion. The

design rate of 675,000 cubic feet per day, but for the present the rate is expected to be around 525,000 feet.

When the sludge line reaches Long Island, future provisions have been

made for a connection to receive similarly digested sludge from a plant which the City of Boston is planning to build. This plant will treat sewage from the Boston main drainage system which is now discharged, without treatment, on the outgoing tide from the outlet at Moon Island, about 1½ miles west of Long Island. All sludge-carrying pipe will be kept clean with go-devils.

The power plant will operate without outside power and light. Equipment will include a 750-kva gas-engine generator; two 750-kva dual-fuel-engine generator units; and two 210-hp dual-fuel engines directly connected to blowers of 5,000-cfm capacity. Digester gas will drive the gas engine, while either digester gas, oil, or a combination of both will run the dual-fuel engine.

### V. Barletta Co. Contract

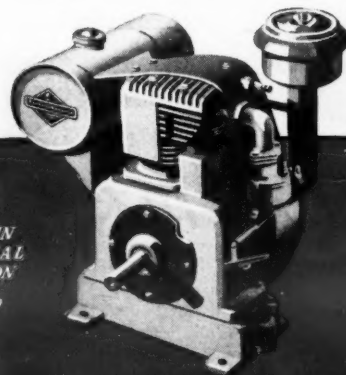
The V. Barletta Co. contract included 20,000 cubic yards of concrete placed in the sedimentation and aeration tanks, the conduits and channels, and the

(Continued on next page)



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foundation for the main building. Form work was the most important feature of this part of the project, for it included not straight walls alone, but all manner of curves, cones, elliptical sections, etc., with a diversity of shapes. Because of the odd and complicated layouts, only wood forms were used. And 500,000 board-feet were required.

Whenever possible the forms were built in a carpenter shop erected at the south end of the site. The shop was a 40 x 60-foot wood-and-tar-paper building with good window lighting under the sides, and also electric lights hanging overhead. Large wooden layout workbenches were used to initiate the form construction. Equipment included a Fay & Egan 12-inch tilting arbor saw, a 24-inch band saw, a Stanley 3/4-inch drill press, and three portable saws—two SkilSaws and a Mall.

In the straight form work, panels were used measuring 7 feet 6 inches long x 2 feet 10 inches high. Boards 11/16 inch served as the faces. They were backed with 2 x 6 studs on 12-inch centers, and with either 2 x 6 or 4 x 4 for wales, usually on 2-foot 8-inch centers. Richmond Tyscrus on 32-inch centers, vertical and horizontal, held the forms together. Outer shoring or bracing was done with either 4 x 4's or 2 x 6's.

The 8-inch roof slabs of the sedimentation tank have supporting beams, 3 feet deep x 18 inches wide, every 16 feet. Roof forms were held up by Symons safety shores on 4-foot centers both ways. They consisted of double 2 x 4's separated by a telescopic T-bar or jack for adjustment. They were capped with 3 x 10's, across which 2 x 6 stringers were placed on 18 to 20-inch centers to support the panels.

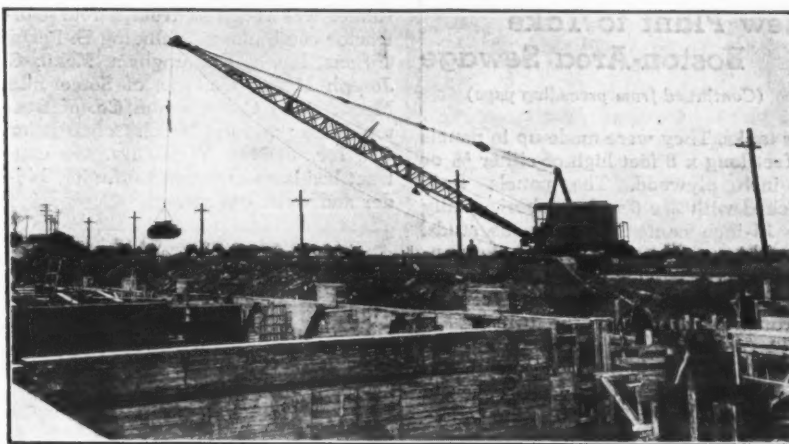
#### Truck-Mixed Concrete

Job equipment included two Lorain cranes with 75 and 65-foot booms, a Lorain truck crane with a 45-foot boom, and a Caterpillar D7 tractor-dozzer. The sites were excavated with the crane buckets loading to 4 Sterling trucks. Drainage was important on this coastal spot. So at a low point a 60-inch pipe 180 feet long—the emergency overflow line for the completed structure built under a previous contract—acts as a sump. When high tides or rain flooded the excavations, the water ran to the sump where it was pumped out into the ocean by a Jaeger 6-inch pump. Six other Jaeger pumps, one 4-inch, two 3-inch, and three 2-inch, were also available for supplementary pumping around the site.

Reinforcing steel was supplied by the Bethlehem Steel Co. from its plant at Sparrows Point, Md., and shipped by rail to the Boston & Maine RR yards at Charlestown, Mass. From there it was hauled to the job site in trucks. All the concrete used on the project in both of the structure contracts was furnished by the Whittemore Co. of Roslindale, Mass., which made deliveries in 6-yard truck-mixers, either Smith, Jaeger, or Ransome. Up to 12 truck-mixers were used on the larger pours, and the haul distance was 9 miles.

Practically all the concrete, except for some of the footings, was placed in the forms by the cranes handling 1-yard bottom-dump buckets, both Blaw-Knox and Insley. For the lower footing pours, the truck-mixers chuted the concrete into hoppers and elephant-trunk pipes for placement. The concrete was vibrated with Ingersoll-Rand pneumatic vibrators, driven by a couple of I-R air compressors. Forms were kept in place for four days after a pour, and the concrete was cured with water spray; hydrants were near by for the necessary supply of water.

Because of the nature of the form work and the design of the structures, no great amount of concrete was poured at any one time; the average for an 8-hour day was around 125 yards when a pour was in progress. The mix varied



C. & E. M. Photo  
A Lorain crane with a 75-foot boom lifts forms from the sedimentation-tank walls of the new sewage-treatment plant.

for different parts of the structures, but the average was 1 : 2 1/2 : 3 1/2, using 7 bags of cement to the yard. This resulted in a 4,000 to 5,000-pound strength concrete. Sand and gravel served for

the aggregate, while Lehigh portland cement of the Merriman type was used.

#### Quantities and Personnel

The major items in the V. Barletta

Co. contract include the following:

Excavation	40,000 cu. yds.
Concrete	20,000 cu. yds.
Reinforcing steel	2,500,000 lbs.
Light steel work	175,000 lbs.

An average force of 80 men was employed on this contract under the direction of Horace Del Grosso, Superintendent, with Frank Venti as Engineer.

#### Digestion Tanks

The four digestion tanks constructed by Farina Bros., Inc., are 110 feet in diameter, and from 30 to 32 feet deep. The heavily reinforced concrete walls are 2 1/2 feet thick at the bottom, and taper in to 1 1/2 feet at the top. They are supported on a foundation footing 3 feet thick around the periphery, sloping down to an 8-inch floor slab at the center of the tank. The fixed covers on tanks 1 and 2 have roof slabs 7 1/2 to 9 inches thick.

The foundation excavation was handled by a Lima crane with a 65-foot boom and a 3/4-yard clamshell bucket. Wooden forms were used on the circle—  
(Concluded on next page, Col. 2)



Announcing  
the



REVOLUTIONARY SILVER

**BONDED Cutting BLADES**

**FOR SAWING CEMENT CONCRETE**

• ASPHALTIC CONCRETE

TILE • GLAZED BRICK • STONE

• A HIGH SPEED BONDED BLADE

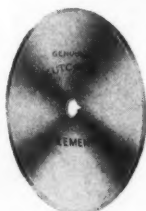
• A LONGER LASTING BONDED BLADE

• A SAFER BONDED BLADE

The exclusive **Bonding** process gives this new cutting blade a longer cutting life. The **Bonding** of the rim to the blade far surpasses previous blades used in the field, and due to the new process of manufacturing, it entirely eliminates the possible hazards of segments leaving the blade while in operation. Under actual tests it has lasted as much as 3 to 5 times as long as ordinary or fluted wheels.

Our tests have proved that the abrasiveness of the metals on the cutting rim are of the highest quality. The cutting cost continually and consistently obtained with the CUTCRETE Silver Bonded Blades is much lower than costs obtained from the fluted type blades.

CUTCRETE CORPORATION can assure you of obtaining the lowest and most consistent cutting cost when sawing—



CEMENT  
CONCRETE



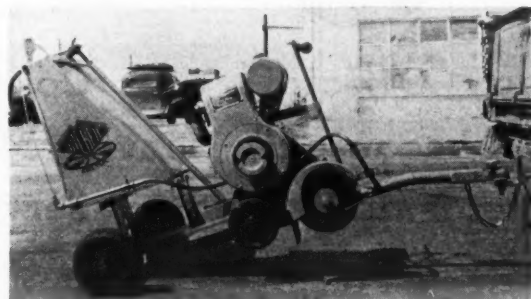
ASPHALTIC  
CONCRETE



TILE



STONE



#### CUTCRETE CONCRETE CUTTER

The most unique unit in its field.

Sawing before breaking "Protects the edge, and the rest is easy."

SELF-TRAILED, one-man operation, plus **Silver Bonded Saw Blade**, equals the lowest priced and most consistent concrete and asphalt saw on the market.

Write Today for Literature  
and name of nearest distributor

**CUTCRETE CORPORATION**

2511 E. CHEVY CHASE DRIVE

GLENDAL 6, CALIFORNIA





Here the Multi-Tool, with a flexible utility shaft, drives a wire scratch brush. Belted, the unit will drive any machine in the 2-hp range.

### Utility Power Unit Delivers Up to 2 Hp

A gasoline power unit designed for driving shop tools and other utility purposes is announced by the Detroit Division of the Continental Motors Corp., 620 Ford Bldg., Detroit 26, Mich. Known as the Multi-Tool, it is said to deliver up to 2 hp at speeds ranging from 1,600 to 2,600 rpm. The speed range can be extended by means of accessory equipment. A built-in control is designed to maintain the pre-selected speed regardless of load. Power is transmitted either direct from the main take-off shaft, or through an automatic transmission which is optional equipment.

According to the manufacturer, the Multi-Tool can be used with a flexible utility shaft to drive drills, grinders, sanders, buffers, or polishers. Or it can be belted to drive any machine in the 2-hp range. The Multi-Tool weighs 50 pounds and has rounded hand holes at each end of its housing to simplify carrying.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 3.

### Concrete Vibrator

A lightweight heavy-duty concrete vibrator is made by the Dart Mfg. Co., 1246 Champa St., Denver 4, Colo. It is powered by a 5-hp gasoline engine and is said to deliver up to 16,000 vibrations per minute. The unit is precision-engineered to stand high speeds, thus adding to its life and performance. These vibrators are also available with 3 or 2.3-hp engines. Weight of the large unit is listed at 224 pounds. Electrical or extra-heavy-duty units can also be supplied by the company.

Among the features claimed for the Dart vibrator are a head bearing which is easily replaced, a non-collapsible housing, variable speeds, and a full-swivel base which allows the engine to be turned in any direction. The self-lubricated head is designed to retain an oil supply at all times and in any position.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 23.

### Wire-Rope-Users' Handbook

A catalog designed to serve as a handbook for users of wire rope has been made available by the Wire Rope Institute, 1044 Shoreham Bldg., Washington 5, D. C. This 119-page publication has been edited by the Institute's Technical Committee, and contains information on all phases of the wire-rope industry.

Among the data presented in the catalog is information of use in selecting, buying, and using wire rope. It also describes fittings attachments, splicing, and other related subjects.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 78.

### New Plant to Take Boston-Area Sewage

(Continued from preceding page)

lar tanks. They were made up in panels 4 feet long x 8 feet high of either  $\frac{3}{4}$  or  $\frac{1}{2}$ -inch plywood. The panels were backed with 2 x 6's placed horizontally on 15-inch centers to serve as studs. Double 2 x 6 wales were then set vertically on 3-foot centers. Richmond Tyserus on 32-inch-average centers through the wales held the forms.

The pours were made usually in either 6 or 7-foot lifts at a time, with the crane handling a  $\frac{3}{4}$ -yard concrete bucket which was filled from the truck-mixers. The steel for the reinforcing was supplied by the Concrete Steel Co. The concrete was vibrated pneumatically, and cured with a water spray. In a future contract the concrete walls of the tanks will be faced with brick and granite.

The major items in this contract were only two in number: concrete, 5,400 cubic yards; and reinforcing steel, 1,500,000 pounds. Farina Bros., Inc., employed an average force of 25 men under James Cartarelli, Superintendent.

#### District Commission

Besides the South Metropolitan Sewer System touched upon here, the Greater Boston area also has a North Metropolitan Sewer System, and the Boston Main Drainage System. The Construction Division of the Metropolitan District Commission is headed by Karl R. Kennison, Chief Engineer. The Division Engineer in charge of all field work is Frederick W. Gow, while Anthony V. O'Malley is Resident Engineer at the Nut Island Sewage Treatment Plant construction.

In the water-supply field the Commission will soon be engaged in the construction of a circular tunnel nearly 6 miles long between Shafts 5 and 7 which are about 300 feet deep. This City Tunnel section of the Hultman Aqueduct will be 10 and 12 feet in diameter. It will require about 200,000 cubic yards of excavation, and 90,000 cubic yards of concrete for the lining. Shaft 7 is at the Chestnut Hill Reservoir, while Shaft 6 is west of Newton Center, west of the Boston City Line. Shaft 5 is alongside the Charles River in Weston.

The shafts were completed in 1947, but the tunnel will take 40 months to finish. A low bid of \$9,529,867 for the

tunnel was received from a four-contractor combination including B. Perini & Sons, Inc. of Framingham, Mass.; C. Joseph Maney Co. Inc. of Somerville, Mass.; Rugo Construction Co. of Boston, Mass.; and the Walsh Construction Co., Inc., of New York City. The contract has been awarded to the low bidder and work has started.

### Allis-Chalmers Promotions

Richard M. Stone has been named Industrial Sales Manager by Allis-Chalmers Mfg. Co., Milwaukee, Wis. He succeeds Wm. J. Faulkner who has joined the Frantz Tractor Co., New York. E. G. Kullmann is now Asst. Gen. Sales Manager for Allis-Chalmers.

**RAINCAP**

STOPS MOISTURE FROM FALLING INTO TRACTOR EXHAUST... Just slip the "RAINCAP" over the open end of your tractor exhaust, and you eliminate forever the danger of moisture falling into the exhaust, injuring your tractor.

THE CAP THAT DOES NOT FORGET TO CLOSE... Completely automatic—the "RAINCAP" is counter-balanced to open when the tractor starts and close when it stops. Rust proof—made of cast aluminum with bronze bushing—can be installed in two minutes. F.O.B. Waterloo, Iowa.

Write Dept. C-1

Immediate delivery  
Liberal dealer discount

No.	O.D. Exhaust	Retail
1	2 1/2"	\$1.90
2	2 3/8"	1.90
3	2 3/4"	1.90
5	1 7/8"	1.90
55	2"	1.90
5x	1 3/4"	1.90
6	1 1/2"	1.90
66	1 3/8"	1.90
7	2 1/2"	1.90
8	3"	2.50
9	3 1/8"	2.50
10	3 1/4"	2.50
11	3 1/2"	2.75
115	3 3/4"	3.00
12	4"	3.00
123	4 1/8"	3.00
125	4 1/4"	3.00
14	4 1/2"	3.00

**WATERLOO FOUNDRY CO., WATERLOO, IOWA**



Highway Officials and Contractors Choose  
**DUPLEX** because it's Heavier, More Powerful, and  
Gives Years of Satisfactory Service.

Limited Territory Available for Distributors

**DUPLEX TRUCK COMPANY**  
LANSING 4, MICHIGAN



## Equipment Distributor Doings

### Parts Delivered by Plane

A West Virginia distributor can deliver spare parts for equipment on the same day they are ordered, even though the machine may be located on a job hundreds of miles away, or the part is not carried in stock. The Baldwin Machinery Co., 1549 Hansford St., Charleston, is distributor in this area for Lorain, LeTourneau, and Jaeger equipment. Deliveries are made possible through the use of a Bellanca airplane which operates regularly between the company's headquarters and plants of its suppliers, and frequently flies the part directly to the site where it is needed.

When the company receives an order for a spare part it does not stock, under unusual or emergency situations, it telephones the requirements directly to the manufacturer. After the order has been placed, the Bellanca takes off, while the part is being rushed to the airport to await its arrival.

### Okla. Dealer for 21 Years

The Herd Equipment Co. of Oklahoma City recently celebrated its 21st year of service to the highway and heavy-construction industry. The occasion was marked by the completion of an overall remodeling program of the company's business premises located at 920 N. W. 5th St. Remodeling included the service department, showroom, and offices.

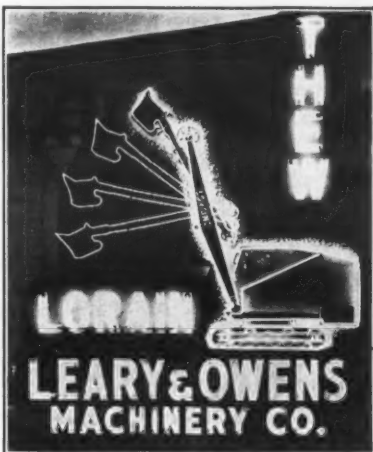
The company is headed by Roy R. Herd. Erman F. Rawlings was recently appointed Sales Manager, and the Service Department is under the supervision of Jack Myracle.

### Montana Dealer Expands

A new office building has just been opened by the Northland Machinery Co., 103 N. Richland Ave., Sidney, Mont. Among the lines handled by Northland are those of Allis-Chalmers Mfg. Co.; Baker Mfg. Co.; Broderick & Bascom Rope Co.; Gar Wood Industries, Inc., including the Findlay Division; Frank G. Hough Co.; Pacific Car & Foundry Co.; Southwest Welding Mfg. Co.; American Tractor Equipment Corp.; Diamond T Motor Co.; Drott Mfg. Corp.; and Northwest Engineering Co.

### N. Y. Dealer's Sales Agents

Lorin McAfee and Ira Blow have joined the sales force of the T. E. Potts Equipment Co., Inc., 2260 Sheridan Drive, Buffalo 17, N. Y. Mr. McAfee will cover the counties of Cattaraugus, Chautauqua, Allegany, and Steuben. Mr. Blow will cover the counties of Niagara, Orleans, and Genesee.



Sidewalk superintendents can now get their fill around the clock, thanks to this Neon sign of a Lorain TD-20 shovel in action. The sign is on display at the Montgomery, Ala., branch of Leary & Owens Machinery Co., construction equipment distributor.

### Neon Sign Pictures Shovel

A novel Neon sign is on display at the Montgomery, Ala., branch of Leary & Owens Machinery Co., Inc. It measures 8 x 12 feet and pictures a crawler-mounted Lorain TL-20 shovel. The sign has 12-inch red-bordered letters, and the shovel is the typical Thew yellow.

A flasher feature, working progressively from bottom to top, makes the shovel dipper look as if it's moving. The four positions of the dipper follow in quick order and simulate the actual digging action of the machine. The sign was made by the Dixie Neon & Decorating Co., of Birmingham.

Leary & Owens headquarters are located in Birmingham. The Montgomery branch is a recent company expansion.

### News of Tennessee Dealer

The Machinery Division of Dempster Bros., Inc., 312 W. Springdale Ave., Knoxville 17, Tenn., has recently opened a new building to house its parts and service departments and showrooms. It is 130 x 100 feet and is of steel-frame construction with aluminum sheeting. Dempster has branches at Nashville and Chattanooga. Lines handled include Link-Belt, LeTourneau, Worthington, Ransome, Huber, Anthony, Novo, Mixermobile, and others.

### Changes in "Cat" Agencies

Changes in the ownership of two Caterpillar distributorships have recently taken place—one in Wisconsin and the other in California. James D. Nagle and Robert T. Hart have resigned their positions with the Nagle-Hart Tractor & Equipment Co., Madison, Wis. A new organization, retaining the corporate name, has been formed with A. A. Wencel as President and Treasurer; Irv Kunert and M. C. Anderson, Vice Presidents; and G. M. Mathes, Secretary. Main offices will be maintained at 754 E. Washington Ave., Madison. Branches are at the Wisconsin-Broadway Bldg., 312 E. Wisconsin Ave., in

Milwaukee, and at 1111 Menominee in Eau Claire.

In San Jose, Calif., a new organization has replaced the Rye Tractor & Equipment Co. as distributor of Caterpillar products in San Benito and Santa Clara counties. The latter company was dissolved recently upon the retirement of its President, James Rye. Ditz Bros., 1841 S. First St., has taken over distribution. Branches are maintained in Hollister and in Gilroy. The company is headed by George Ditz, Jr., President and Sales Manager; George Ditz, Sr., Vice President; and Jack Ditz, Secretary-Treasurer.

### Penn Drake Distributors

Two new distributors have been appointed by the Pennsylvania Refining Co. of Cleveland, Ohio. L. D. Seely Co. is named distributor of Penn Drake snow-plow wax for the state of New Jersey. Offices are located in Eatontown, N. J., at South and Clinton Sts. Clear Oil Co. is named distributor in

the northern Ohio area for Penn Drake Gumout, a gum solvent for use in all types of gasoline-powered engines. Clear Oil is located at 1836 Euclid Ave., Cleveland 15, Ohio. It will handle the Lake, Cuyahoga and Lorain Counties.

### Branch for Montana Dealer

The Mountain Tractor Co. of Missoula, Mont., has opened a new branch at 273 N. Main St., Kalispell, Mont. George E. Martin will be Manager of the Kalispell branch. He will be assisted by George Breck, Field Representative; Lincoln Engel, Parts Manager; and Robert (Bob) Schweitzer, Service Manager. The company will continue to maintain a stock of merchandise and repair parts, as well as a repair shop, at the Missoula office.

### N. Y. C. Dealer Relocates

The Mott Haven Equipment Co., Inc., has announced the removal of its offices to 211 E. 149th St., New York 51, N. Y.

With



**ALL-METAL CLUTCH FACINGS**

**"CATERPILLAR"**

**PUTS POWER**

**WHERE IT**

**PAYS OFF**



You cut power losses . . . get dependable starts and stops . . . when your tractors and earthmovers are Velvetouch equipped. Because Velvetouch clutch facings and brake linings are built tough . . . to give you peak performance on every job. You'll find they last longer, too . . . for Velvetouch products are all-metal . . . to insure maximum service life.

FOR BRAKE AND CLUTCH USE



Velvetouch clutch discs for steering clutches, front and rear power control unit clutches.

**THE S. K. WELLMAN CO.**  
1274 East 51st St. • Cleveland 3, Ohio

WORLD'S LARGEST MANUFACTURERS OF ALL-METAL CLUTCH FACINGS AND BRAKE LININGS

**SUPER STRENGTH** for the *Toughest Tasks!*



**LA CROSSE**  
TRAILER CORPORATION

The La Crosse Trailers powerful combination of rugged 6 x 6 H beam axles, alloy steel spindles and cast steel wheels possessing twice the strength of malleable wheels gives that extra protection when the job calls for carrying unevenly distributed loads.





**BUY**



**NOW!**



# Oiled-Earth Roads Found Satisfactory

State Builds Them Where Granular Materials Are Scarce and Costly and Traffic Is Not Heavy

★ OILED-EARTH road construction may have a good deal of merit, where traffic is not heavy and where granular materials cannot be obtained except at very high cost. This was the theme of a paper presented to the County Engineers' Institute at its meeting on December 8-11, 1947. Author of the paper was John H. Swanberg, Engineer of Materials and Research, Minnesota Department of Highways. This paper was incorporated in the report of the Asphalt-Soil Stabilization Committee of the American Road Builders' Association at its conference in Washington in January.

Mr. Swanberg's study dealt particularly with Illinois' use of road oil on earth roads. It was based on letters and talks with highway officials, and on firsthand observation of county and township roads in the state.

## History of Oiled-Earth Roads

States other than Illinois have for some time used oil on earth roads, Mr. Swanberg reported. As early as 1925 Minnesota used it on trunk highways. A typical Minnesota treatment on a silty-clay and gumbo subgrade consisted of 1/4 to 1/2 gallon of road oil (comparable to the present SC-2), followed by a second application covered with 200 to 500 yards of gravel. But the steel wheels on distributors, on graders, and on wagons had a tendency to pick up the bituminous material. And it was found that such surfaces would not stand up under heavier traffic, especially during the spring break-up. So in Minnesota these surfaces were superseded by a substantial layer of gravel topped by a bituminous mat.

By 1929 California, too, was treating earth roads with four or five applications of road oil at the rate of 0.75 gallon per square yard. Adobe soils, it was reported, were improved by adding sand and river gravel. But other

soils needed no aid, except drainage. In 1923 Illinois used about 40,000,000 gallons of road oil on its highways—with mingled success and failure, according to a report by Wilbur M. Wilson in a University of Illinois Bulletin dated July 7, 1924. However, the successes marked the possibilities of oiled roads when properly constructed, he said.

## Causes of Failure

Mr. Wilson listed the following causes of failure of oiled roads, said Mr. Swanberg:

1. Not enough oil was used.
2. The road was covered with dust at the time the oil was applied.
3. The roadbed was not thoroughly consolidated at the time the oil was applied.
4. The oil was of such a character that the oiled earth did not have sufficient binding properties.
5. The oil was of such a character that the oiled mat separated from the subgrade.
6. The soil was spongy and the subgrade did not have enough structural strength to support the oiled mat.
7. The road was not properly shaped, and water, unable to run away, formed puddles in the road.
8. The side ditches did not have outlets; this caused the water table to stand near the surface of the roadway and weaken the subgrade.

As a part of his conclusions, Mr. Wilson stated: "In view of these observations it seems safe to conclude that an oiled road properly constructed may be expected to remain in good condition ten or eleven months out of a year and that, unless the season is especially bad or the soil and drainage conditions are unfavorable, the road may be expected to be passable for automobiles for the entire year."

## Current Practice in Illinois

Today, Illinois' standard specifications carry an item which covers the oiling of earth roads. The following procedure, with local variations, is usually used:

The earth grade is reshaped before oil is applied, and the surface is left smooth and well compacted; free from sod, vegetation, excess loose dirt or dust; and dry enough so that the wheels of the distributor will not rut or mar the surface. As soon as the road is closed to traffic and before the oil is applied, excess dust and loose dirt is either removed from the surface or it is thor-

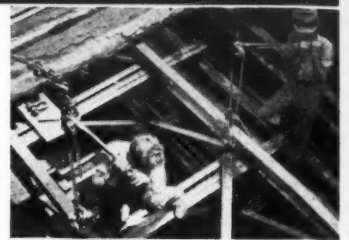
oughly wetted, consolidated with the undisturbed soil beneath, and allowed to dry to the proper moisture content. If the removal of the dust and loose dirt leaves an uneven or rough surface, the earth grade is restored to a condition satisfactory to the Engineer. The specifications say that the total quantity of oil applied shall be not less

than 0.25 gallon nor more than 0.75 gallon per square yard as required by the Engineer. Where the total quantity of oil to be applied is 0.4 gallon or more per square yard, it is put down in two applications. Enough time must elapse between successive applications to permit the absorption of the oil to such

(Continued on next page)

# Want Safe, Easy Pulling?

There's a **COFFING**  
**SAFETY-PULL HOIST**  
(RATCHET LEVER TYPE)  
**FOR EVERY JOB**



Safety-Pull Hoists moving steel inserts with safety and ease

## Why COFFING Is the Better Hoist

- Hooks of drop forged, heat treated steel.
- Dual ratchet and pawl assembly for maximum safety.
- Replaceable "Safety-load" handle will bend before any other part of the hoist gives.
- Handle is reversible—Hoist operates in any position.
- Every model factory tested to 100% over rated capacity.

## SEND FOR BULLETIN CRL-5

OTHER COFFING PRODUCTS — Electric Hoists • Differential Hoists • Hoist-Jacks • "Mighty-Midget" Puller • Spur-Geared Hoists • Load Binders • Trolleys.



**THE COFFING HOIST COMPANY**

DANVILLE, ILLINOIS

# ROCKFORD



# POWER TAKE-OFFS

**SELF CONTAINED UNIT**

**WIDE RANGE OF SIZES**

**CONSERVATIVE RATING**

**ROLLER BEARINGS**

**FINE ADJUSTMENT**

**ACCURATE BALANCE**

**S.A.E. DIMENSIONS**

\* Fine adjustments of **ROCKFORD POWER TAKE-OFFS** are maintained by simple, positive locking means, located near the outer diameter of the clutch. The lock is readily accessible, through a hand-hole in the bell housing or cover.

**Send for This Handy Bulletin** Shows typical installations of **ROCKFORD CLUTCHES and POWER TAKE-OFFS**. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

# GARRISON

Hydraulic STEERING BOOSTERS

Make

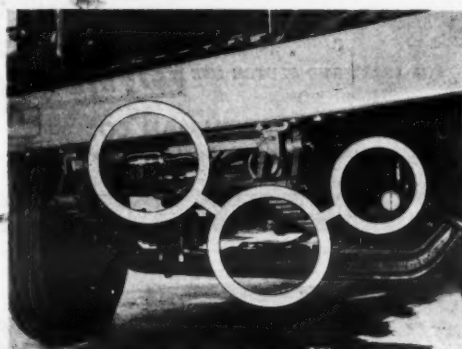
**TOUGH STEERING**

Easier - Faster

Safer

Easily Installed on—

- HEAVY DUTY TRUCKS
- ROAD GRADERS
- WHEEL TRACTORS



GARRISON HYDRAULIC STEERING BOOSTERS not only save time but increase the efficiency of the operators of heavy-duty trucks and earth-moving equipment by reducing "road shock," "wheel fight" and driver fatigue. Operating automatically through the steering effort of the operator, mechanical steering is in effect at all times.

Write for full information and learn how many contractors are now increasing the efficiency of their earth-moving equipment with Garrison Hydraulic Steering Boosters.

Kits available for all leading makes of Heavy Duty Trucks Truck Cranes and Wheel Tractors

Contact your factory dealer or write direct to Garrison Manufacturing Co.

**Garrison Manufacturing Co.**

1506 So. Santa Fe Ave., Los Angeles 21, Calif.

**ROCKFORD CLUTCH DIVISION**

314 Catherine Street, Rockford, Illinois, U.S.A.

BORG-WARNER



extent that the soil will not adhere to the wheels of the distributor.

The road is closed to traffic while the oil is applied. It remains closed at least 48 hours after the final application, or longer if deemed necessary by the Engineer. Excess oil which remains on the surface at the time the road is opened to traffic is covered with a thin layer of loose earth to absorb it. The road oil is tested by the State and must conform to the state specifications for Road Oil E-2, E-3, or E-4.

In some of the counties, the oil is covered right after application with soil bladed from the shoulders, with sand, pit-run gravel, or stone chips. When this procedure is followed the road is opened to traffic just as soon as the covering material is applied.

Engineer of Materials H. W. Russell commented: "We have used road oil for the surface treatment of roads in this state for more than 30 years and have had good results. Road oils are usually used only where a cheap local aggregate is not available. It is our opinion that if an adequate supply of low-priced local aggregate can be obtained, the placement of a substantial amount of these granular materials is preferable to the oil treatment of the heavy soils. The compacted granular material could be dustproofed by the addition of a single-application bituminous surface treatment or by some other approved method."

#### County Practice

Mr. Swanberg went on to report the practice of individual counties in Illinois. Champaign County, for instance, applies from 1/2 to 3/4 gallon per square yard, in one or two applications depending upon the weather, condition of the road, etc. Usually each road is scarified in the spring, though some sections may be left that appear to have gone through the winter without developing chuck holes. Champaign County Superintendent of Highways, R. F. Fisher, states: "The effective part of any oiled road is only about one inch thick. No matter how many years you have applied oil, this mat thickness remains the same. And although there may be evidence of oil down in the ground more than a foot, this mat is in reality the oiled road."

H. A. Kluge, Madison County Superintendent of Highways, reports: "The production of an oil mat on a new road usually requires 3 years. The first year, after grading, 1/2 gallon of road oil per square yard is applied. The result is a mat too thin to withstand the freezing and thawing action during the winter, and the road usually becomes badly potholed and generally in bad shape. The following year the surface is scarified to a depth of approximately 4 inches, smoothed by the use of motor graders and maintainers, and again oiled at the rate of 1/2 gallon per square yard. That year the results are somewhat better, although the road will go to pieces if we have a severe winter. The third summer the road is again scarified, bladed, and oiled, and that year we expect to produce a surface that will go through the winter without much breaking up. Thereafter some 50 to 70 per cent of the mileage must be scarified and re-oiled each year using 0.25 to 0.40 gallon per square yard."

"The procedure we use in preparing the surface for the oil application is first to scarify to a depth of 4 inches. The motor graders windrow this loose material and then proceed to grade the sub-base to an even crown; any excess earth from the ditches or shoulders is spread on the sub-base prior to spreading the material which has previously been windrowed after scarifying. The reason for doing this is to keep the previously oiled earth on the surface of the road. After the loose material has been spread over the road to the proper crown, the traffic is allowed to use the

road to roll it down and harden it. This usually takes about a week, and in the meantime the road is dragged with a light maintainer every other day. We like to produce a hard smooth surface to receive the oil.

"The mat we strive for is a hard rubber-like mat about 1/2 to 3/4 inch in thickness; of course, after years of oiling we do have oiled earth to a depth of 4 to 6 inches by keeping the oiled earth on top during grading operations."

He reports that during the past few years he has experimented with the stabilization of 6 inches of earth by the road-mix method, using 1/2 gallon per square yard per inch of thickness.

Christian County's methods are substantially the same as those reported by Madison County, with some variations depending upon conditions. Depth of scarifying is no greater than is nec-

essary to eliminate the surface roughness. Further, the degree of pulverization is not carried beyond the point which would permit recompaction to a smooth surface. On a job graded in 1945, 0.3 gallon of road oil E-2 was applied that year; 1 gallon per square yard was placed in three applications in 1946; and 0.4 gallon of road oil E-2 was applied in 1947. The road was then closed for a week. Afterwards 0.4 gallon of SC-4 and 40 pounds of 1/2-inch stone chips were applied followed by 0.3 gallon of SC-4 and 30 pounds of chips. Of 1,400 miles of road in Christian County, 1,100 to 1,200 miles are oiled-earth roads, reports Christian County Superintendent Carl Royer.

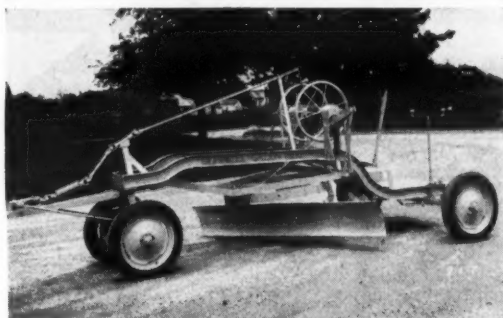
#### Inspection of Oiled-Earth Roads

Mr. Swanberg also described what he saw on an inspection trip in Macon, Sangamon, Moultrie, Douglas, Cham-



"Don't mention no names. Just say a spokesman for labor."

paign, Christian, and Piatt Counties. The oiled-earth roads examined, he (Concluded on next page)



GLEDHILL MODEL 7-A GRADER

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- Pneumatic Tires
- Self locking raising and lowering device
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For berm work, parks, cemeteries, light ditching and general maintenance. Send for detailed specs!

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for all ASPHALT maintenance jobs

Here's a mixer for all types of asphalt patching jobs . . . driveways, parking lots, sidewalks, buildings: Wherever there is an asphalt patching problem. Take it anywhere; tow it behind a car or truck. It is easy to handle and will mix either hot or cold material. It will produce 3 cu. ft. in 30 seconds. The new Kinetic mixing principle assures a thorough coating of aggregates. For details, send for Bulletin K-100.

**THE FOOTE COMPANY, INC.**

1916 State Street • Nunda, New York

(See page 48)



**FOOTE**

MULTIFOOTE CONCRETE PAVERS  
ADNUN BLACK TOP PAVERS  
Kinetic ASPHALT MIXERS



## Oiled-Earth Roads Found Satisfactory

(Continued from preceding page)

said, ranged in age from 1947 construction to treatments 30 years old. The subgrade soils found varied from silt loams to silty clays, all having a very high silt content. He was told, however, that in some counties clay soils had been treated with satisfactory results. The oiled surfaces varied from those which were obviously slick and slippery during wet weather to those which had a stone-chip cover. The treatments varied in width from 9 feet on township roads and some county roads, to 18 feet or more. Invariably the roads were found to be in good condition with isolated cases of local potholing.

Subgrades below the mat were observed to be dry and very well compacted. But roads which had been treated varied from those with high grades and good ditches to those in which the ditches were narrow and shallow and the adjacent land was higher than the road. Everyone whom the inspection party interviewed, however, expressed strongly the need for a high degree of compaction of the subgrade and good drainage. The traffic on the oil-treated earth roads was generally low in volume, with the usual proportion of farm hauling. But the party was told that this type of road had proved satisfactory up to a volume of 300 vehicles per day, and that some of the roads exceed this volume.

Mr. Swanberg said he and his group were advised that after many years of oil treatments oil was found to a depth of 12 to 18 inches, but that this was probably the exception. After several years the more usual depth is perhaps closer to 4 to 6 inches. However, the tough rubbery mat in any case is approximately  $\frac{1}{2}$  to  $\frac{3}{4}$  inch thick. The presence of oil below the surface crust was not too apparent, he reported, although the thought was expressed that the presence of the oil contributed substantially to preventing the entrance of moisture into the upper subgrade.

The consensus appeared to be that during the first years after construction some breaking up would usually occur, but that after about 4 years of treatment the break-up would be minor in amount. However, the usual procedure, at least for portions of the roads, is to continue the application of oil in reduced quantities over a number of

years. In most cases the usual practice is to consider the treatment as a maintenance treatment, and applications of oil have been made almost every year for as long as 30 years.

Mr. Swanberg summed up his inspection this way: "From our observations, the success of this type of treatment in Illinois is largely dependent upon obtaining a rich rubbery mat approximately  $\frac{1}{2}$  inch in thickness. In all roads which we inspected there was no evidence that this rich surface resulted in roughness, although it was stated that at times during hot weather corrugation did occur, in which case the mat was scarified and re-laid."

### Conclusions

His paper to the County Engineers' Institute closed with the following conclusions: The oiling of earth roads in Illinois was initiated and has been continued primarily because of the lack of granular materials except at high cost. An enormous quantity of oil has been used during the past 30 years or more with results on light-traffic county and township roads that are satisfactory enough to justify its continued use under such conditions. Except for this type of construction, many miles of rural highways would perhaps be unsurfaced, and highways now giving reasonably satisfactory service most or all of the year would be impassable during the spring and rainy seasons. This method of construction has apparently been accepted by the public as a quick and economical method of getting out of the mud.

Some of the conditions in Illinois, he said, which make the oiling of earth roads satisfactory have been the critical shortage of granular materials, the amount of traffic, the type of oil used, the nature of the soil, and the repeated treatments over many years. Whether a similar program would be successful in other states will depend on the conditions in those states. With present costs for oil and application, the initiation of such a program merits careful study of the costs and the results likely to be obtained in comparison with the placement of a granular base and surface mat. There is good reason to believe, said Mr. Swanberg, that the traffic volume found to be the maximum desirable in Illinois should not be exceeded in other states. Whether the soils found in other states are such as to prove satisfactory with this type of treatment can be determined only by

trial.

If such a program is initiated, Mr. Swanberg concluded, it should be considered a continual maintenance project. The traveling public should be made aware of the fact that continual maintenance will be necessary and that at least in the early years it may not be too satisfactory during certain seasons of the year. Where appropriate conditions prevail, he feels that experimental projects would be worthy of trial. But if they are undertaken, two important considerations must not be overlooked; first, that the grade is compacted to

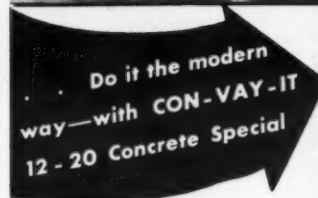
high density; and second, that traffic is kept off the surface until the oil has completely penetrated.

### Palmer Elected by NCPM

John M. Palmer has been elected President of the National Clay Pipe Manufacturers, Inc. He is Sales Manager of the Lee Clay Product Co., Clearfield, Ky. D. M. Strickland, of Atlanta, and John D. Cook, of Chicago, were reelected as Vice President and Secretary-Treasurer, respectively. F. S. Cresswell was reappointed Manager.



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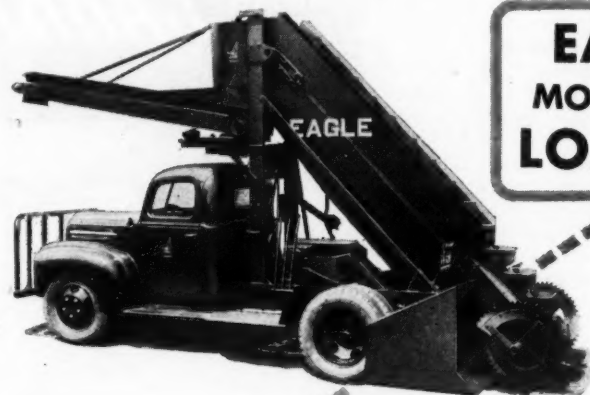
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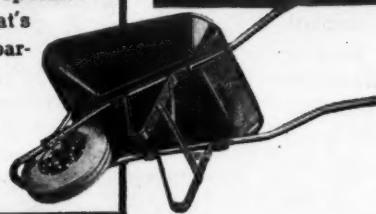


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WHEELBARROWS





Laughlin's new clevis grab hook is attached by slipping the clevis pin into place and securing it with a cotter pin. Sizes are from 1/4 to 3/4 inch.

### Clevis Grab Hook

A clevis grab hook featuring ease of attachment is made by The Thomas Laughlin Co., 133 Fore St., Portland, Maine. It is attached by slipping the clevis pin into place and securing it with a cotter pin.

All parts of the Laughlin hook are drop-forged and heat-treated. A special housing covers the end of the clevis pin to prevent the cotter pin from catching on clothing, or scratching. The hooks are available in sizes from 1/4 to 3/4 inch.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 21.

### Dump Bodies, Hoists

A line of standard dump bodies and hoists is produced by A. Cresci & Son, Inc., Vineland, N. J. There are three types of hoists and ten types of bodies in the Cresci line. The bodies feature a low loading height, reinforced tail-gate, and sturdy construction. All bodies of 72 inches and wider are made with a one-piece 8-gage steel floor.

The light-duty Models S-6 and S-7 hoists are of the straight-push type. They have a maximum dumping angle of 50 degrees. The heavy-duty Models C-6, C-7, and C-7H are of the double-arm lift-roller type with a single cylinder. They have a maximum dumping angle of 58 degrees. The extra-heavy-duty Models C-12 and C-14 are similar to the heavy-duty, except that they are equipped with a double cylinder. Maximum angle of dump is 55 degrees.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 47.

### Welding Alloys Directory

A survey taken to show the weldability of commercial alloys has been condensed in catalog form by the Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y. Subjects covered in the booklet are types of welds, equipment design, and practical applications of special gas and arc-welding rods. The 8-page 3-color catalog is designed to serve as a technical directory on the subject of welding alloys.

Welds are classified broadly in this directory in groups of alloys and metals in widest use—cast iron, steel, aluminum, brass and bronze, copper, nickel, and magnesium. Two sets of tables are used to show welding rods designed for use on these various metals and alloys. One table is for repair operations, and the other is for production processes. The 1948 Eutectic welder directory also contains a short resumé of recent welding developments by the company, and a list of the various rods which it makes.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 67.

### News of Link-Belt Co.

A district sales office has been established in Jacksonville, Fla., by the Link-Belt Co. of Chicago. It is located at 137 E. Forsyth St. Robert L. Lowder, formerly District Sales Engineer at the Link-Belt plant in Atlanta, Ga., is in charge of the new office.

C. C. Wiley has been appointed District Sales Manager for the Baltimore branch, to succeed H. Merrill Bowman. Mr. Bowman has been made Assistant Divisional Sales Manager for power transmission, with offices in Chicago. James Tommie Bell, Jr., succeeds Mr. Wiley as District Sales Manager at Birmingham, Ala.

The Ball & Roller Bearing Division of Link-Belt announces the promotion of two of its personnel to Assistant Sales Managers: Arthur E. Maha in the central division with headquarters at the Dodge plant in Indianapolis, Ind.; and Lewis M. Watkin, Jr., in the eastern division with headquarters in Philadelphia.

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**TUTHILL GUARD RAILS**

Efficient: easily-seen, spring-mounted convex panels cushion and deflect blows.  
Quick Installation: panels cut to convenient lengths, wide-spread posts.  
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### Be Sure Your CONCRETE IS CURED



- Lyons & Lyons are pioneer designers of canal curing and joint filling equipment for Bureau of Reclamation Projects.
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4. HUBERT H. EVERIST, Central Valley
5. ARIZONA-NEVADA, Central Valley
6. OTTO B. ASHBACH, Coachella Valley
7. MORRISON-KNUDSEN & HASLER, Central Valley

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| 1—Double Plate Girder, 36" High, 35' Span, Wt.....       | 13,684 lbs.      |
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| 1—Truss Span, 5 Panels, 16'6" Wide, 108' Span, Wt.....   | 103,241 lbs.     |
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One-man ratchet lever jack of great power. 60" steel handle, automatic lowering and double lever socket. Height closed 28" with 19" rise. Weight 94 to 98 lbs.

**\$19.75** each  
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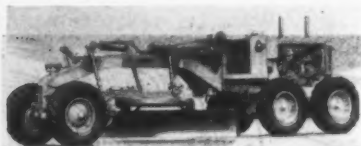
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Tel. Tarrytown 4-2100, Ext. 6







Galion's new 100-hp Model 116 grader has a variable weight, from 23,285 to 25,050 pounds. It is diesel-powered and hydraulically controlled.

## Heavy-Duty Grader Has 100-Hp Engine

A 100-hp diesel-powered heavy-duty motor grader has been announced by The Galion Iron Works & Mfg. Co., Galion, Ohio. The Model No. 116 grader has a variable weight ranging from 23,285 to 25,050 pounds depending upon its extra equipment. It is completely hydraulically controlled, and the manual steering arrangement is equipped with a hydraulic booster system.

The Model No. 116 has 14.00 x 24 low-pressure tires, both front and rear; it has an all-gear tandem drive, and eight forward speeds ranging from 1.5 to 26.0 mph. Precision controls permit grading to exact specifications, the manufacturer states.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 32.

## Flexible-Tubing Line

Flexible tubing adaptable to many uses is made by the Ronaflex Tubing Co., Inc., Packard Bldg., Philadelphia 2, Pa. It is designed to stand up under high temperatures and pressures, vibration, and internal and external corrosive solvents and fumes. The manufacturer explains that this durability has been attained by incorporating Buna and Neoprene synthetics in the construction of the tubing, and protecting with a woven wire braid.

According to the manufacturer, the 1/4-inch tubing will stand pressures up to 1,000 psi, and temperatures up to 300 degrees F. Lightweight couplings of the snap-on type are provided with standard Ronaflex assemblies. They are said to give a tight grip without the need for packing or extra tightening. Standard tubing sizes range from 1/4 to 2 inches ID, and in any length up to 200 feet in small diameters and 50 feet in large diameters.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 9.

## Puller in Four Sizes

An improved model of its puller has been announced by the Chisholm-Moore Hoist Corp., Tonawanda, N. Y. It is lighter and sturdier than its predecessor, and is furnished in 1/4, 1 1/2, 3, and 6-ton capacities. It is designed to lift or pull at any angle.

The castings for the housing, cover, and handle are made of aluminum alloy. The lift wheel and ratchet are of high-carbon steel. The number of teeth in the brake and lever ratchets has been increased to permit more accuracy in load spotting. Up and down motion is controlled by a trigger on the handle. A ring has been attached to the free end of the chain to keep it from being unintentionally pulled through the lift wheel, and as an added convenience in adjusting the chain in free wheeling.

Bronze bushings are used at all rotating points. They are self-lubricated for life. Gears are packed with a non-aging grease and are sealed in a dust-proof grease-tight enclosure. Herc-Alloy steel chain is supplied as standard equipment.

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2—1946 STERLING HB 600 Tractors CUMMINS Diesel Motor, A-1 condition.

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3—22 Ft. platform bodies, spool type wheel. H.B. 600 CUMMINS Diesel Motor, dual rear drive, will shorten chassis for concrete mixers, or will make good tractor for low bed shovel trailer.

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2—INTERNATIONALS, Model KR11.

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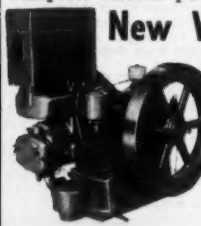
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Completely equipped with dust collection unit discharging into boot of hot elevator. Plant is equipped with 3-compartment cold storage hopper and feeder for regulation of feed into the dryer. 4' x 10' vibrating screen, 40-ton bin, 1-ton mixer, dial scales complete with all motors and drives.

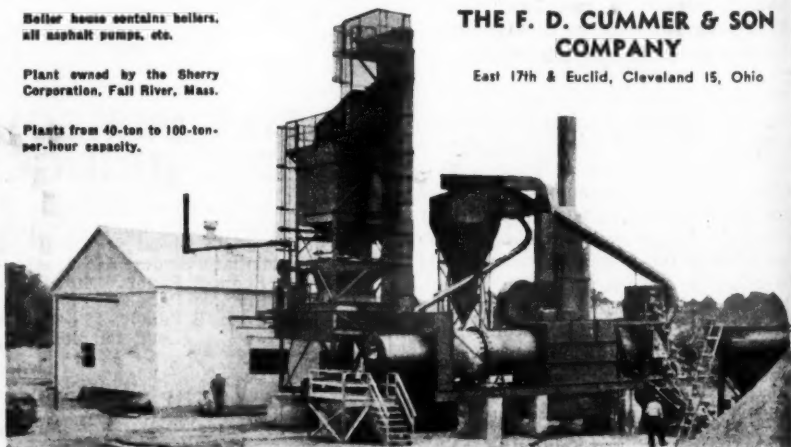
Boiler house contains boilers, all asphalt pumps, etc.

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Tornadozer goes anywhere on your job in a hurry. Top speed of 15 m.p.h. and giant rubber tires let you "run" where a tractor must "crawl". 1000' is only a minute away . . . a mile is a 5 or 6 minute run.

With the Tornadozer you can travel 1000' . . . complete a 13-minute dozer job and return to your original assignment in 15 minutes. This speed and mobility permits handling more jobs per dozer . . . materially cuts on-job move time and idle stand-by time . . . eliminates non-productive dozer time.

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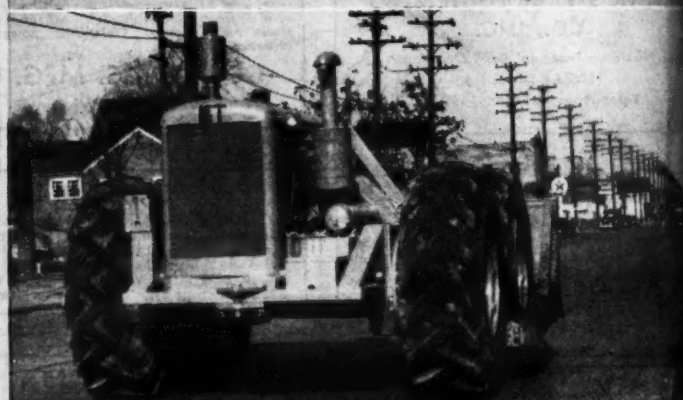
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